Questionnaire
Summary of the main activities of a research institute of the Slovak Academy of Sciences

Period: January 1, 2012 - December 31, 2015

1. Basic information on the institute:

1.1. Legal name and address

Polymer Institute of the Slovak Academy of Sciences
Dúbravská cesta 9, 845 41 Bratislava 45, Slovakia

1.2. URL of the institute web site

http://www.polymer.sav.sk/

1.3. Executive body of the institute and its composition

Directoriat	Name	Age	Years in the position
Director	Igor LACÍK	53	6
Deputy director	Jaroslav MOSNÁČEK	40	6
Scientific secretary	Mária OMASTOVÁ	53	2

1.4. Head of the Scientific Board

Peter CIFRA

1.5. Basic information on the research personnel

1.5.1. Number of employees with university degrees (PhD students included) engaged in research projects, their full time equivalent work capacity (FTE) in 2012, 2013, 2014, 2015, and average number of employees in the assessment period

	2012		2013		2014		2015		total		
	number	FTE	number	FTE	number	FTE	number	FTE	number	averaged number per year	averaged FTE
Number of employees with university degrees	61,0	42,550	63,0	44,120	60,0	47,720	63,0	43,580	**247,0**	**61,8**	**44,493**
Number of PhD students	17,0	16,160	17,0	14,250	15,0	12,660	15,0	11,750	**64,0**	**16,0**	**13,705**
Total number	78,0	58,710	80,0	58,370	75,0	60,380	78,0	55,330	**311,0**	**77,8**	**58,198**

1.5.2. Institute units/departments and their FTE employees with university degrees engaged in research and development

Research staff	2012		2013		2014		2015		average	
	No.	FTE	No.	FTE	No.	FTE	No.	FTE	No.	FTE
Institute in whole	61,0	42,550	63,0	44,120	60,0	47,720	63,0	43,580	**61,8**	**44,493**
Department of Composite Materials	18,0	12,510	20,0	14,120	19,0	11,900	23,0	13,970	**20,0**	**13,125**
Department of Molecular Simulations of Polymers	4,0	3,500	6,0	4,530	6,0	3,580	2,0	2,000	**4,5**	**3,403**
Department of Biopolymers Research	15,0	10,780	17,0	10,420	15,0	9,630	18,0	9,720	**16,3**	**10,138**
Department of Synthesis and Characterization of Polymers	24,0	15,760	20,0	15,050	20,0	16,610	20,0	17,890	**21,0**	**16,328**

1.6. Basic information on the funding of the institute

Institutional salary budget and others salary budget

Salary budget	2012	2013	2014	2015	average
Institutional Salary budget *[thousands of EUR]*	631,575	633,536	630,956	657,259	**638,332**
Other Salary budget *[thousands of EUR]*	192,264	254,866	253,470	184,253	**221,213**

1.7. Mission Statement of the Institute as presented in the Foundation Charter

Slovak Academy of Sciences

Presidium

Bratislava, September 10, 2010
Number: 472/G/12/2010

DECISION
of the Presidium of the Slovak Academy of Sciences
Issuing the Foundation Deed of the Polymer Institute of the Slovak Academy of Sciences
(Resolution of the Presidium of SAS no. 371 dated September 01, 2010)

The Presidium of Slovak Academy of Sciences, acting pursuant to Art. 21 of the Act of the National Council of the Slovak Republic no. 523/2004 Coll. on Budget Rules in Public Administration as amended and pursuant to Art. 10 and Art. 15 of the Act of the National Council of the Slovak Republic no. 133/2002 Coll. on the Slovak Academy of Sciences, hereby issues the following

F o u n d a t i o n D e e d:

Name of organization:	**Polymer Institute of the Slovak Academy of Sciences**
Seat of organization:	**Dúbravská cesta 9, 845 41 Bratislava 45**
Identification number:	**00586927**
Financing form:	**Contribution organization**
Organization type: (Art, 15 of the Act no. 133/2002 Coll. of the Slovak Academy of Sciences)	**Scientific organization**
Established on:	**December 17, 1962**
Title of statutory body:	**Director**

Founder: **Slovak Academy of Sciences, Štefánikova 49, 814 38 Bratislava**

Art. 1
Main Purpose and Scope of Activities

1. The Institute concentrates on primary research of polymers and biopolymers in relation to their properties.
2. The Institute aims at development of the science about macromolecules, preparing and improving new experimental and theoretical methods of study of polymer systems.
3. The Institute performs scientific research activities in majors: macromolecular chemistry, organic chemistry, technology of macromolecular substances, material chemistry, physical chemistry, nanomaterials, nanotechnologies, molecular electrotechnics, theoretical and computer chemistry, biomaterials, bioplastics, composites, paper, and cellulose.
4. The Institute develops products, technologies, special substances and materials on the basis of previous research and investigation of opportunities of the application there of both nationally and in abroad. After patenting, the Institute seeks potential interested partners, and in case of conclusion of a contract, licences for specific products and/or services are sold.
5. The Institute organizes doctoral studies pursuant to generally valid law.
6. The Institute develops cooperation with organizations of related scientific majors, with universities, and with research institutes both nationally and internationally.
7. The Institute provides for publishing of results of scientific research activities in periodical and non-periodical press. Publishing periodical and non-periodical press is governed by the resolutions of the Presidium of the SAS.
8. The Institute provides for promotion of the results by various forms pursuant to valid law with professionals and with the general public.
9. The Institute provides for organizing national and international conferences, workshops, and seminars for the employees of the Institute, for national and foreign scientific workers, and for students.
10. The Institute provides advising and expert services related to the main activity of the Institute.

Art. II
Material and Financial Determination of Assets Administered as State Assets by the Polymer Institute of the Slovak Academy of Sciences

1. The Polymer Institute of the Slovak Academy of Sciences administers assets acquired by own activities and assets entrusted to the Institute to perform its purpose and scope of activities. These assets are registered in the books and operative registers of the Institute.
2. Immovable assets are formed by the real estate registered with the relevant land registers as of the date of issue of this Foundation Deed.
   Real estate in land register area of Bratislava-Karlova Ves, according to Extract from Ownership Deed no. 2552, plot no. 2706, 2710/9, building number 5798 on plot no. 2706, building number 5799 on plot no. 2710/9.
3. Movable assets administered by the Polymer Institute of the Slovak Academy of Sciences are formed by tangible assets, intangible assets, small tangible assets, small intangible assets, and assets in operative registers according to the financial statements.
   Assets – Balance sheet as of December 31, 2009, residual value: EUR 832,706.04
   Other movable assets:
   Library fund as of December 1, 2009: 5275 library units
   The financial value of this fund is in line with the records of the accrual list.

Art. III
Historical Development of the Organization

By the Resolution no. V/1 of the Presidium of Slovak Academy of Sciences dated December 17, 1962, the Polymer Laboratory of the Slovak Academy of Science was separated from the Polymer Department of the Wood, Cellulose and Synthetic Fibres Institute. By the Resolution no. IV/1 of the Presidium of Slovak Academy of Sciences dated September 12, 1966, the Polymer Laboratory was renamed to Polymer Institute of the Slovak Academy of Science. Effective on January 01, 1981, the Institute was integrated into the Chemical Research Center of the Slovak Academy of Sciences by the Resolution no. 509 of the Presidium of the Slovak Academy of Sciences dated November 25, 1980. On the basis of the Resolution no. 16 of the Presidium of the Slovak Academy of Sciences dated February 22, 1990, the Polymer Institute of the Slovak Academy of Sciences became separate since April 01, 1990.
By its Resolution no. 172 dated December 17, 1992, the Presidium of the Slovak Academy of Sciences approved the change of the financing form of the Polymer Institute of the Slovak Academy of Sciences from a budget organization to a contribution organization, effective since January 01, 1993.

Art. IV
Legal Personality of the Organization

The Polymer Institute of the Slovak Academy of Sciences is a legal entity able to acquire rights and liabilities independently.

Art. V
Organization Structure of the Organization

The organization structure of the Polymer Institute of the Slovak Academy of Sciences is regulated in more detail by the Organization Code of the Polymer Institute of the Slovak Academy of Sciences, issued by the Director after approval by the 2nd Department of Sciences of the Slovak Academy of Sciences

Art. VI

The Polymer Institute of the Slovak Academy of Sciences shall have perpetual existence.

Art. VII
Final Provision

On the effective date of this Foundation Deed, the validity of the Foundation Deed of the Polymer Institute of the Slovak Academy of Sciences no. 474/G/12/2009 dated July 28, 2008 shall end.

prof. RNDr. Jaromír Pastorek, DrSc.
Chairman of the SAS

illegible signature; round seal: Slovak Academy of Sciences, Bratislava

1.8. Summary of R&D activity pursued by the institute during the assessment period in both national and international contexts, (recommended 5 pages, max. 10 pages)

The Polymer Institute of the Slovak Academy of Sciences (PI SAS) is the leading academic institution in the field of macromolecular chemistry, polymer physics and polymer material science in Slovak Republic with its focus shifting in recent years also to biomaterial sciences. The activities and outcomes in basic and applied polymer science possess a significant role in both national and international context. A large portion of research output is the result of international cooperation within the EU research area and other countries worldwide. This is documented in the selected publications and projects, respectively.

The research profile of PI SAS is reflected by the organization structure consisting of four research departments:

1) composites, nanocomposites, biopolymers, blends, electrically conductive polymers and composites, thermally conductive composites, adhesives, surface treatment of polymers and phase change materials (**Department of composite materials**),
2) development of polymer chemistry in diabetes treatment and monitoring, polymers for cancer treatment, synthesis of bioconjugates with different aims, stimuli sensitive polymers, non-biofouling polymers, hydrogels, additives, fundamental research on kinetics of free-radical polymerization in aqueous solution, (**Department for biomaterials research**),
3) molecular simulations of polymers, confined polymers (DNA in nanochannels), folding of model proteins, polymer brushes, simulation of structural and material properties of condensed polymers (**Department of molecular simulation**), and
4) development of controlled/living polymerization techniques, synthesis of defined functional polymers, synthesis of nanoparticles and hybrid dispersions, degradation and stabilization of polymers, polymer flammability, photochemical studies in polymers, liquid chromatography for effective separation of macromolecules, structure/properties relation studies (**Department of synthesis and characterization of polymers**).

Key research topics and most important results selected and described further below have significance in the international context. In addition, we can identify certain fields of research with leading role where the institute participates in the formation of current global trends.

- Immobilization of pancreatic cells for diabetes treatment
- Mechanism and kinetics of free-radical polymerization in aqueous solutions
- Photochemically induced reversible deactivation radical polymerization techniques
- Understanding confined polymers through molecular simulation
- Chemiluminescence
- Electroconductive polymers, composites and nanocomposites

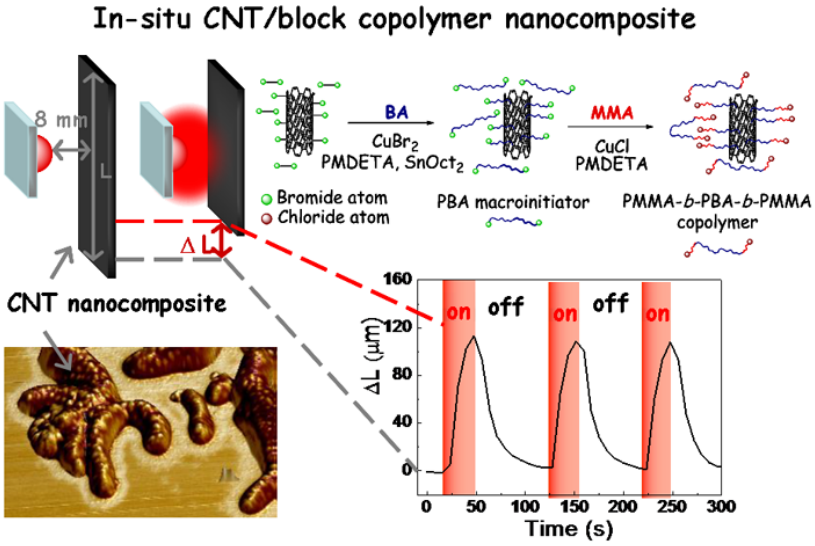
The most important topics and results produced by PI SAS over the assessment period are selected below.

1. *Development of photochemically induced atom transfer radical polymerization.*

Each technique of reversible deactivation radical polymerizations has both advantages and disadvantages influencing their applicability. Among the main drawbacks of atom transfer radical polymerization (ATRP) is the need to use catalysts based on the complexes of lower oxidation state metal halides, which easily oxidize in the presence of oxygen. Moreover, these catalysts are usually used in quite high concentrations. Therefore the final polymer products are often contaminated with the catalyst residues and their purification is expensive and time-consuming. Within the research at the PI SAS, a new variation of ATRP technique was developed. This technique enables use of complexes of higher oxidation state metal halides without the need of reducing agents, while the *in situ* reduction is achieved photochemically by irradiation at wavelength λ > 350 nm. The developed photoATRP has both economic and environmental impact since it enables synthesis of well-defined polymers at ambient temperature with low concentration of catalyst (50 – 100 ppm) and in significantly shorter polymerization time (irradiation increases the rate constant of polymerization k_{app} in almost two orders). It was found that regardless of the type of originally used copper catalyst, after its photochemical reduction and subsequent reaction with alkyl bromide initiator, $CuBr/CuBr_2$ catalytic system is formed *in situ* and thus the kinetic of polymerization is the same in all cases for all copper catalysts. This allows for using of either cheaper naturally available $CuSO_4$.$5H_2O$ or better soluble organic copper compounds as copper catalysts for photoATRP. In addition, photoATRP of (meth)acrylates can be performed in the presence of limited amount of air without the loss of control, which is significant step toward applicability of ATRP for industrial production of polymers.

2. *Synthesis of new materials based on hybrid (nano)particles.*

Surfaces of various inorganic or carbon-based (nano)particles were modified by organic species and/or polymer chains in order to prepare new materials with tailored properties for special applications. The multi-walled carbon nanotubes (MWCNT) were modified by surface initiated ATRP (SI-ATRP) to improve compatibility with thermoplastic elastomers (TPE) such as SIS or poly(methyl methacrylate)-*b*-poly(butyl acrylate)-*b*-poly(methyl methacrylate) (PMMA-*b*-PBA-*b*-PMMA) and introduce photoactuation behavior to the TPE material. ATRP performed from the surface of non-conductive graphene oxide (GO) led to simultaneous reduction of GO surface and preparation of conductive reduced graphene oxide hybrids. This developed system was subsequently used for preparation of surface modified and controllably reduced GO for obtaining GO hybrids with conductivity tailored for electrorheological suspensions. Carbonyl iron (CI) particles, commonly used in magnetorheological suspensions, were modified by SI-ATRP of glycidyl methacrylate (GMA), which resulted in improved stability of the suspensions with easier redispersability, higher oxidation stability of particles under high temperatures and acidic pH. In addition, an absence of cytotoxicity and a high magnetic response make the prepared CI-PGMA particles a promising material also for biomedical applications. Surface initiated ring opening polymerization was used for modification of MWCNT with PLA chains. Equimolar mixtures of *L*-PLA and *D*-PLA containing only 0.5 wt. % PLA-functionalized MWCNT preferentially crystallized in the form of stereocomplexes either during precipitation from solution or during thin-film formation by the slow evaporation of solvent. Moreover, their crystallization in the form of stereocomplexes after melting was, completely reversible without the formation of any homochiral crystallites, which is considered to be an exceptional observation.



Formation of block copolymer poly(butyl acrylate-co-methylmetacrylate) used for stabilization of carbon nanotubes.

3. *New probes for monitoring processes in polymers involving the free radical sensing, molecular dynamics, crosslinking, degradation and use in photonics.*

Photochemical studies have been traditional topics of interest at PI SAS. They can be divided into three areas:

a) Photoactive mono- and diketones, such as derivatives of benzophenone, acetophenone, benzil, and bisbenzil are liable to radical reactions under irradiation. These derivatives were tested mainly in biodegradable polyesters such as poly(ε-caprolactone) and poly(L-lactide) with the aim to photochemically tailor the service lifetime of polymers,

b) Novel derivatives of dimethylaminobenzoic acid and hindered amine based adducts were synthesized for the monitoring of radical processes in solutions as well as in polymer matrices. Pyrene-cholesterol adducts were employed for lipophilic cholesterol based compatibility evaluation for polymer composites using fluorescence spectroscopy. The important part of the research is synthesis of fluorophores with a specific functional group capable to link on various materials. Highly fluorescent rhodamine and benzothioxanthene fluorophores were used for visualization and characterization for silanol based surfaces and clay minerals and

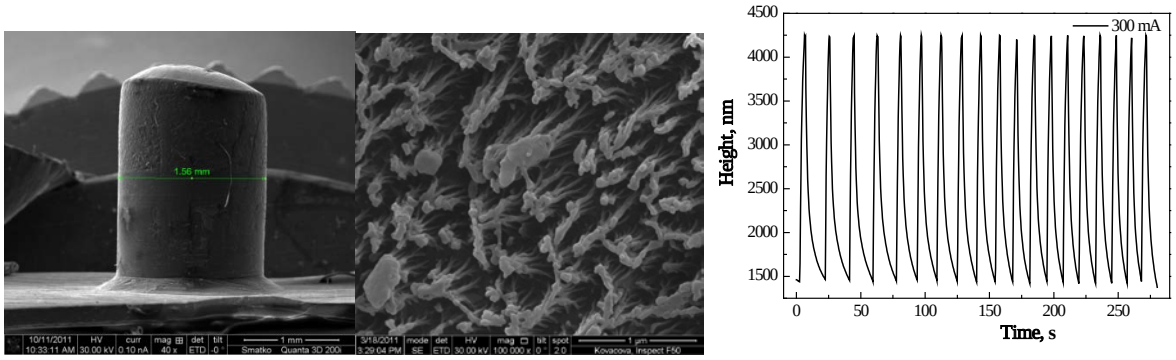
c) π-conjugated systems are rapidly developing area of electronic components in organic electronic devices such as solar cells, OLEDs and transistors. For these purposes 2,2'-bithiophenes and various donor-acceptor molecules were spectrally characterized in solution and polymer matrices. Re-arrangement of HOMO-LUMO electrons in carbonyl-substituted bithiophenes led to significant changes of their fluorescent properties and these features have been retained in the polymer matrices. The enhancement of fluorescence was observed for donor-acceptor chromophores linked with imidazole and tetra-fluoro-phenyl π-linkers in highly viscous polymer matrices why their charge-transfer character important for application is retained. Studied coumarin-based fluorophores with phenylsemicarbazone linkers capable to interact with various anions could be applied as sensoric molecules through specific intramolecular charge-transfer and H-aggregates formation depending on environment polarity.

4. Characterization of ignition and burning of pure and flame retarded polymers: Cone calorimetry linked to oxidation tests.

Alkaline magnesium compounds (hydroxide and oxide) have strongly promoting effect on the light emission from polypropylene during its oxidation. The activation function of magnesium hydroxide or oxide on oxygen was assumed to be related to reduction of smoke release. DSC exotherm of oxidised polypropylene in the presence of magnesium hydroxide disappears and formation of volatile decomposition products is shifted to higher temperatures. Magnesium hydroxide and magnesium oxide reduce the maximum heat release rate from burning of polypropylene. The effect of the magnesium oxide is even more significant than of Magnesium hydroxide. The mechanism linking both the thermal oxidation and ignition based on switching between oxygen additions to alkyl radicals and/or its disproportionation with alkyl radicals has been formulated.

5. *Nano-optical mechanical system (NOMS)*.

The key outcome of the 7FP project NOMS was the preparation of photoactuating nanocomposites based on ethylene vinyl acetate copolymer (EVA) and multiwall carbon nanotubes (MWCNT). For achieving good dispersion of MWCNT in the polymeric matrix, a noncovalent modification with compatibilizer (cholesteryl 1-pyrenecarboxylate) was used. For testing photo and thermo actuation, two types of materials were prepared. The first one was in the form of a Braille element shape. The best result of actuation was found for composite EVA/0.3 wt.% MWCNT, with 69 μm expansion of Braille element. The second one was the EVA/MWCNT nanocomposite in the form of strips tested during irradiation by different methods. The strips have shown reversible actuation when using the dynamic-mechanical analyser for testing. The measurements showed a bimodal fully reversible response, depending on the method of strip preparation. To our knowledge, the actuation of nanocomposites based on EVA copolymer filled with carbon nanotubes has not been reported so far.

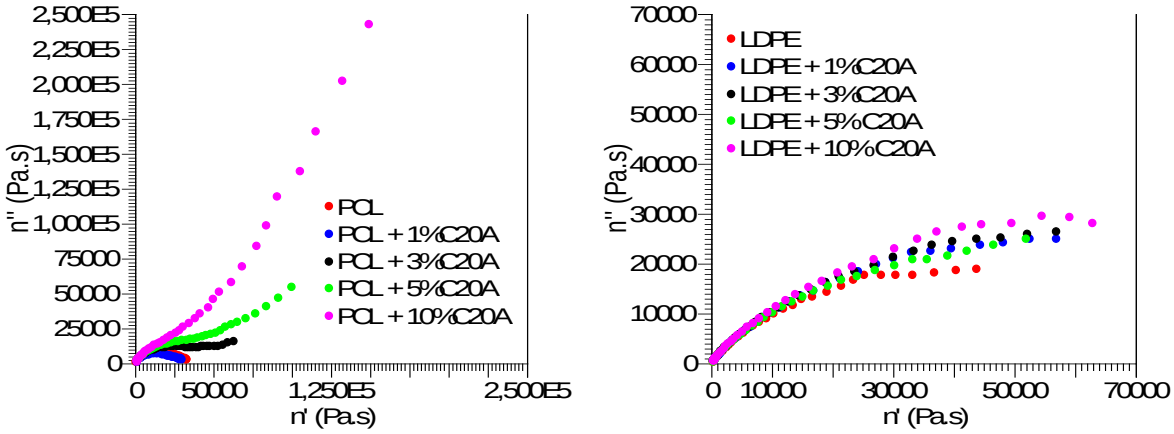


a) b) c)

Photo-actuated nanocomposite of Braille element (BE) shape (a), the orientation of carbon nanotubes in polymeric matrix inside BE (b), and BE height changes during actuation recorded by AFM method (c).

6. Application of rheological parameters for characterization of nanocomposites with polymeric matrix and prediction of structure of nanofillers in nanocomposites.

The method for characterization of nanocomposites based on polymeric matrices filled with clay was developed based on rheological measurements. At present two basic methods have been used to determine a degree of decomposition of the layered structure of the filler, namely electron transmission microscopy and X-ray diffraction. These complementary methods determine the portion of intercalated or exfoliated filler after mixing the clay in the polymeric matrix.
Application of rheological measurements provides additional information on the structure of filler physical network in the nanocomposite. Moreover, a comparison of rheological behavior of the nanocomposite and filler dispersion in a solvent with the same or similar solubility parameter as the polymeric matrix is used for identification of the parameters ruling the formation of the filler structure. By such a way it is possible to distinguish between entirely thermodynamics reasons (ruling the structure formation related to interactions on the filler–polymer phase boundaries) and shear stress during mixing (which is high in a rather viscous polymer and close to zero in the filler dispersion in a solvent). The method has been successfully used for selection of the filler surface modifiers for a particular polymeric matrix.

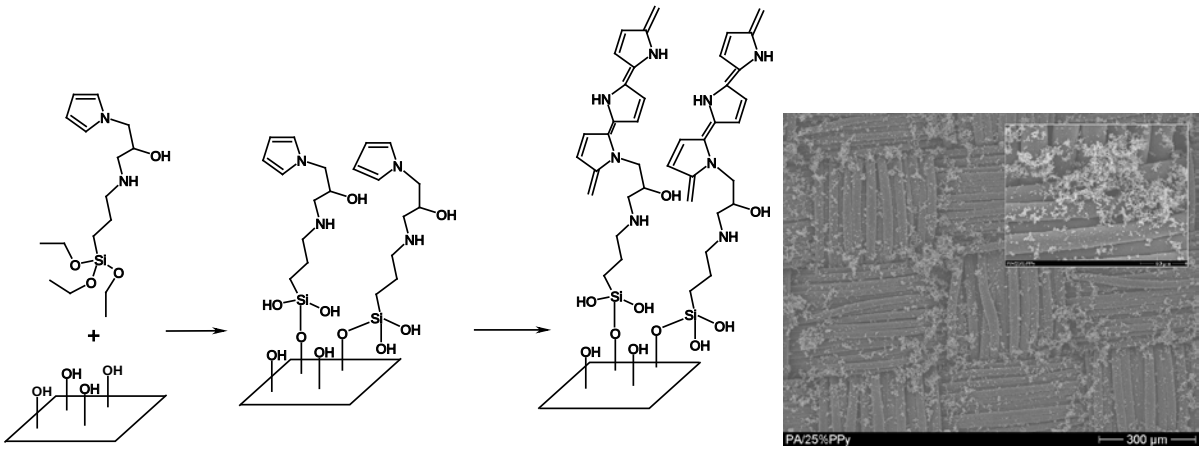


Optimal (left) and unsuitable (right) polymer-filler combination determined by rheological measurement.

7. Conducting textiles.

Electrically conductive polypropylene (PP) and polyamide (PA) textiles were prepared by in situ chemical oxidative polymerization of pyrrole on the surface of textiles. For better adhesion of conducting polypyrrole (PPy) layer on the surface of textiles, the surface was functionalized by pyrrole-silane (SP). In the case of PP, in the first step it was necessary to introduce hydroxyl groups by plasma treatment.
Surface conductivity of modified PP and PA increases with the increase of PPy content used for surface modification. In both cases (PP and PA) the presence of covalently bonded SP increased the adhesion of PPy layers. An increase of SP concentration on the surface of textile improved the washing fastness of PPy layers. The best surface conductivity after washing was achieved in the case of PA textile (3×10^{-4} S/square), which was premodified by 1.0 wt.% SP and consequently modified by 25 wt.% PPy.

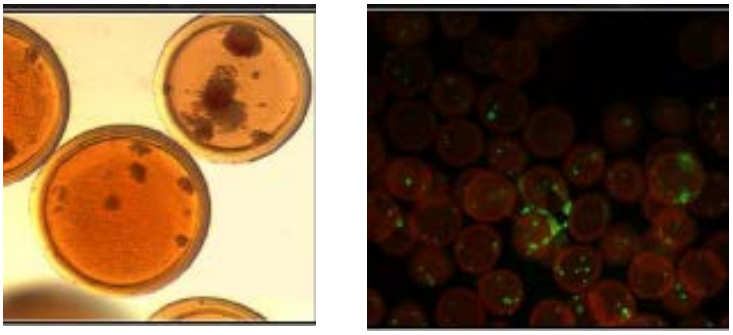
a) b)



The mechanism of bonding of the conductive polypyrrole layer on the surface through SP treatment on PA textiles (a), and SEM of PA premodified with SP and coated with 25 % PPy after washing (b).

8. Immune-protection of transplanted pancreatic islets in polymer microcapsules in diabetes treatment.

Polymeric microcapsules are being proposed as a device for encapsulation of pancreatic islets and, generally, insulin-producing cells, which after transplantation to diabetic patient continuously control the blood glucose levels. The microcapsules function as an immune-protective semipermeable membrane for transplanted cells and allow for a complete avoidance of immunosuppression. We have got a strong position globally in the design of polymeric microcapsules, their physico-chemical characterization and process of preparation. The microcapsule based on sodium alginate, cellulose sulfate and poly(methylene-co-guanidine) has been the “label” microcapsule of PI SAS, which has shown its applicability in various animal models from rodents to primates. The obtained data resulted in pre-clinical validation within a prestigious project from the Encapsulation consortium of Juvenile Diabetes Research Foundation (2014-2016).



Baboon islets of Langerhans encapsulated in polyelectrolyte microcapsule (size ~800 µm) explanted after 55 days from the peritoneal cavity of a baboon: optical microscopy (left), fluoresce microscopy with viable cells in green (right)

9. Biocompatible and non-biofouling polymeric materials: 2-oxazoline and zwitterionic chemistries.

Two classes of polymers with a high level of biocompatibility and non-biofouling properties, namely poly(2-oxazolined)s and poly(zwitterion)s, have been studied. Living cationic polymerization of 2-oxazolines enables to control structure, topology and properties of prepared polymers. Polycations with controlled charge density and improved biocompatibility have been

prepared by partial hydrolysis of poly(2-alkyl-oxazoline)s of different molar mass and varying alkyl chain. Two different synthetic strategies based on either “one-pot” random copolymerization or thiol-ene “click” reactions have been used for the preparation of poly(2-oxazoline)-based hydrogels with controlled morphology and mechanical properties aimed for cell cultivation and immunoprotection. Poly(zwitterion)s are compatible with blood, exhibit ultra-low biofouling, and enhance the protein stability and bioactivity. Various types of poly(zwitterion)-based materials have been prepared ranging from hydrogels, non-biofouling layers and light-switchable materials to covalently attached protective layers for implantable neural electrodes. In addition to development of polymer-based materials at the PI SAS, we implemented several *in vitro* and *ex vivo* assays for characterization of cyto- and immunotoxicity. Our goal is to understand the interactions of biomaterials and polymers with living matter as well as the effect of biomaterials and polymers on biological processes, intracellular pathways and cells adaptation to changes of their environment.

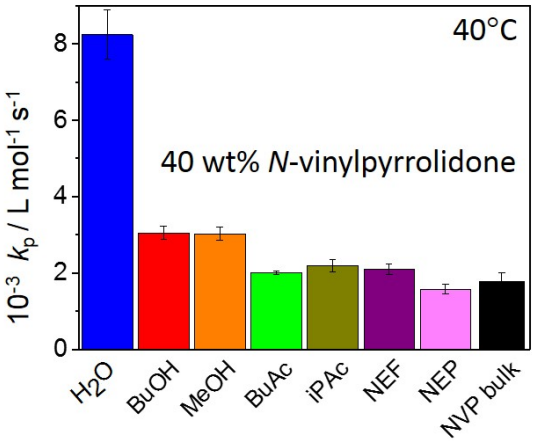
10. Polymers for anti-cancer therapy and drug delivery systems.

Understanding the molecular basis and biological processes responsible for the development and progression of various cancer types is a necessary prerequisite for the design of novel, more specific and selective systems for anti-cancer therapy. Interdisciplinary effort combining medicine (requirements) and polymer chemistry (realization) thus provides both a promising platform for the design of innovative treatment strategies and their realization into an applicable form. Several activities have been ongoing focused on using polymers for anti-cancer therapy and drug-delivery systems: (1) Morpholino in innovative treatment strategies. There are immense efforts to use Morpholino in various fields of human medicine, particularly in the field of anti-cancer therapies focused on gene silencing and the field of invasive medicine and implantations due to its chemical structure and unique properties. In our approach, the emphasis is put on the chemical synthesis of Morpholino and its oligomers and their subsequent implementation into treatment strategies intended for chronic myelogenous leukemia. (2) Chitosan particles. Chitosan particles ranging from nano- to micrometer size have been utilized in various medical disciplines, where the size of particles determines final biomedical application. Our work has been focused on the analysis of various parameters which influence size and stability of chitosan sub-micron particles as well as the strategies to selectively and specifically target tumor cells, to detect them and to deliver therapeutic agents towards, for example, hypoxic tumors and chronic myeloid leukemia. (3) Magnetite nanoparticles for anti-cancer therapy. Magnetite nanoparticles Fe_3O_4 are the most frequently used forms of iron oxide nanoparticles with a great potential as nanocarriers or heating mediators in cancer therapy. Our work is focused on their intracellular application and investigation of the impact of various surface modifications on size distribution and colloidal stability in different media mimicking *in vivo* conditions, on cellular uptake and cytotoxicity towards various human tumor cells, and on their capacity to generate reactive oxygen species in diverse cell types and tissues. Similar strategy is applied for gold and silver nanoparticles.

11. Radical polymerization in aqueous solutions.

PI SAS has gained a strong position in the field of radical polymerization in aqueous solution. The aqueous environment due to strong hydrogen-bonding interactions leads, especially for non-ionized monomers, to a strong dependence of propagation rate coefficient on monomer concentration. This reflects the interactions of the transition state structure with the molecules of solvent consisting of water and monomer, where water molecules provide the internal mobility to the transition state structure. This has been recognized thanks to employing the IUPAC-recommended method pulsed-laser polymerization in conjunction with size-exclusion chromatography. Original the first ever kinetic data have been provided for a number of monomers such as water soluble acrylate and methacrylate monomers, *N*-vinylamides, zwitterions, and

others, in parallel to the method development. For some of these system, a complete description of mechanism and also modeling of molar masses and conversion profiles have become available.



Propagation rate coefficient for radical polymerization of N-vinylpyrrolidone in water, various organic solutions and in bulk.

12. Transitions in confined (bio)macromolecules explored by molecular simulations.

Understanding the mechanism of chain extension of DNA macromolecules in nanochannels underlies interpretation of molecular experiments in nanofluidic devices used for analysis of genomic macromolecules which start to be used recently not only for linear but also for ring macromolecules. We analyzed experimental and simulation results of channel induced extension (linearization) of both topologies. Confinement of DNA by cyclisation or geometric confinement occurs often in biological systems. Results on confined rings show that, like for linear macromolecules, a similar transition between a weak and strong confinement here also occurs. Because of stronger excluded volume in confined rings, however, this transition and also the extent of linearization is shifted. We proposed and tested a similar relation for ring DNA as that used for linear macromolecules.

For linear DNA in nanochannels we observed relatively stable distinctive events characteristic for backfolding of semiflexible macromolecules, which can complicate linearization experiments. Analysis of these events as a function of channel width showed that the abundance of backfolding is higher at the chain ends compared to the middle of confined macromolecule. The decrease of overall macromolecular extension due to backfolding, together with an increased extension in parallel sequences, is known to affect linearization experiments for commonly used channel widths. Less known, but related effect, occurs in the presence of multiple chains in channel that is important in other context. The interest for evaluation of chain segregation of confined macromolecules originates from the studies of segregation in bacterial chromosomes. Up to now these studies are focused on flexible macromolecules. We extended this study to more realistic semiflexible macromolecules. Our results are based on a simulation of free energy of chain at different confinement and on a direct simulation of the process of segregation. Two different approaches provided consistent results in accord with theoretical analysis and have shown a stronger tendency towards segregation for flexible relative to semiflexible macromolecules, both in the extent of segregation as well as in the dynamics of thee process. The mutual avoidance of two overlapping chains in channel leads to enhanced extension of macromolecules and this effect is again stronger for flexible macromolecules, though weaker for the stiffer chains like DNA.

Molecular dynamics studies of compression and bending of helical polymers that include all atoms provided detail data on mechanism of critical buckling of α-helix. Instead of homogeneous

bending predicted by an analytical WLC model, in reality at the buckling threshold a break in helix happens. This kink defect appears as a result of a local melting of helix. Simulations provided the proof on stochastic dynamics of the process, on break of hydrogen bonds and other atomistic details in buckling mechanism. The observed mechanism of helical break can be used also in the interpretation of helix bending in other similar cases except α-helix, for instance in the cyclisation of short DNA molecules.

Molecular dynamics simulations of silicate surface covered by poly(ethyleneoxid) (PEO) chains in presence of free homopolymer lead to confirmation of entropic character of studied systems. At a lover coverage densities the free PEO chains penetrate the anchored PEO chains. Here the short chains played the role of good solvent while the longer chains function as the Θ solvent, that is confirmed by the behavior of thickness of anchored layer from the dependence on the surface coverage which is in accord with the theoretical prediction for coarse grained models.

2. Partial indicators of main activities:

2.1. Research output

2.1.1. Principal types of research output of the institute: basic research/applied research, international/regional (ratios in percentage)

The principal forms of the research output of PI SAS are the peer reviewed publications registered by WOS/SCOPUS scientific databases and the number of citations. Basic research/applied research is 80/20 and the international/regional research is 90/10.

2.1.2 List of selected publications documenting the most important results of basic research. The total number of publications listed for the assessment period should not exceed the average number of employees with university degrees engaged in research projects. The principal research outputs (max. 5, including Digital Object Identifier - DOI) should be underlined

1. ADCA **BENKOVÁ, Zuzana - CIFRA, Peter. Simulation of semiflexible cyclic and linear chains moderately and strongly confined in nanochannels. In Macromolecules, 2012, vol. 45, p. 2597 - 2608. (5.167 - IF2011). (2012 - Current Contents). ISSN 0024-9297. dx.doi.org/10.1021/ma202730c**

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3. ADCA CIFRA, Peter - BLEHA, Tomáš. Detection of chain backfolding in simulation of DNA in nanofluidic channels. In SOFT MATTER, 2012, vol. 8, p. 9022 - 9028. (4.390 - IF2011). (2012 - Current Contents). ISSN 1744-683X.

4. ADCA DANKO, Martin - ANDICS, Anita - KÓSA, Csaba - HRDLOVIČ, Pavol - VEGH, D. Spectral properties of chalcone containing triphenylamino structural unit in solution and in polymer matrices. In Dyes and Pigments, 2012, vol. 92, p. 1257 - 1265. (3.126 - IF2011). (2012 - Current Contents). ISSN 0143-7208.

5. ADCA HRABÁROVÁ, E. - RYCHLÝ, Jozef - SASINKOVÁ, V. - VALACHOVÁ, K. - JANIGOVÁ, Ivica - CSOMOROVÁ, Katarína - JURÁNEK, I. - ŠOLTÉS, L. Structural characterisation of thiol-modified hyaluronans. In Cellulose, 2012, vol. 19, no. 6, p. 2093-2104. (3.600 - IF2011). (2012 - Current Contents). ISSN 0969-0239. VEGA 2/0083/09, VEGA 1/0529/09, VEGA 2/0056/10, VEGA 1/0145/10, VEGA 2/0011/11, VEGA 2/0147/12, ITMS 26220120054, ITMS 26240220040.

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9. ADCA LUSTOŇ, Jozef - KRONEK, Juraj - KLEINOVÁ, Angela - JANIGOVÁ, Ivica - VALENTOVÁ, H. - NEDBAL, J.Synthesis and polymerization reactions of cyclic imino ethers. VI. Polymers with biphenyl structure. In Journal of Polymer Science. Part A.Polymer Chemistry, 2012, vol. 50, p. 3936 - 3943. (3.919 - IF2011). (2012 - Current Contents). ISSN 0887-624X.

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TABAČIAROVÁ, Jana - MIČUŠÍK, Matej - FEDORKO, P. - OMASTOVÁ, Mária. Study of polypyrrole aging by XPS, FTIR and conductivity measurements. In Polymer Degradation and Stability, 2015, vol. 120, p. 392-401. (3.163 - IF2014). (2015 - Current Contents). ISSN 0141-3910. dx.doi.org/10.1016/j.polymdegradstab.2015.07021

59. ADCA **222219 000354801500029**
VEISEH, O. - DOLOFF, J. C. - MA, M. - VEGAS, A. J. - TAM, H. H. - BADER, A. R. - LI, J. - LANGAN, E. - WYCKOFF, J. - LOO, W. S. - JHUNJHUNWALA, S. - CHIU, A. - SIEBERT, S. - TANG, K. - HOLLISTER-LOCK, J. - ARESTA-DASILVA, Stephanie - BOCHENEK, Matthew - MENDOZA-ELIAS, J. - WANG, Y. - QI, M. - LAVIN, D. M. - CHEN, M. - DHOLAKIA, N. - THAKRAR, R. - LACÍK, Igor - WEIR, G. C. - OBERHOLZER, J. - GREINER, D. L. - LANGER, R. - ANDERSON, D. G. Size- and shape-dependent foreign body immune response to materials implanted in rodents and non-human primates. In Nature Materials, 2015, vol. 14, p. 643-651. (36.503 - IF2014). (2015 - Current Contents). ISSN 1476-1122. DOI: 10.1038/NMAT4290

60. ADCA 225005 000360415700063
WINTER, A. D. - CZANIKOVÁ, Klaudia - LARIOS, E. - VISHNYAKOV, V. - JAYE, Ch. - FISCHER, D.A. - OMASTOVÁ, Mária - CAMPO, E. M. Interface dynamics in strained polymer nanocomposites: Stick-slip wrapping as a prelude to mechanical backbone twisting derived from sonication-induced amorphization. In Journal of Physical Chemistry C, 2015, vol. 119, no. 34, p. 20091-20099. (4.772 - IF2014). (2015 - Current Contents). ISSN 1932-7447.

2.1.3 List of monographs/books published abroad

1. AAA01 CAPEK, Ignác. *DNA Engineered Noble Metal Nanoparticles: Fundamentals and State-of-the-Art of Nanobiotechnology*. 1. Salem: Scrivener Publishing LLC, 2015. 637 p. ISBN 978-1-118-07214-1.

2.1.4. List of monographs/books published in Slovakia

2.1.5. List of other scientific outputs specifically important for the institute, max. 10 items

The scientific outputs are represented also by the awards received by the PI SAS researchers for the activities related to their work. The list of the most important is provided below

Awards by the Slovak Academy of Sciences

BENKOVÁ Zuzana	• Young scientist of the year 2012; the award by the Slovak Academy of Sciences, Center for the Scientific Information SR, Committee for the scientific-technical societies, 14.05.2013
BLEHA Tomáš	• Golden medal of the Slovak Academy of Sciences – award by the Presidium SAS for the whole career contribution to the polymer science, specifically for the physical chemistry of polymers; 14.01.2014 • Award to the personalities for the contribution to development of SAS on the occasion of 60the SAS anniversary; 11.09.2013
CAPEK Ignác and the team	• The top team of the Slovak Academy of Sciences based on the evaluation of SAS by independent ranking agency; 3.07.2013
CHODÁK Ivan	• Award by the Slovak Academy of Sciences for scientific and popularization activities; 29.06.2015 • Golden medal of the Slovak Academy of Sciences – award by the Presidium SAS for the whole career contribution to the polymer science, specifically for the polymer blends and composites; 14.01.2014
LACÍK Igor and the team	• Award by the Slovak Academy of Sciences for popularization activities; 29.06.2015 • The top team of the Slovak Academy of Sciences based on the evaluation of SAS by independent ranking agency; 3.07.2013
OMASTOVÁ Mária and the team	• The top team of the Slovak Academy of Sciences based on the evaluation of SAS by independent ranking agency; 3.07.2013 • Award by the Slovak Academy of Sciences for the collection of scientific publications related to the interdisciplinary research on electrically conductive polymer (nano)composites; 2012
RYCHLÝ Jozef	• Golden medal of the Slovak Academy of Sciences – award by the Presidium SAS for the whole career contribution to the polymer science; 14.04.2015 • Award for the significant contribution by the Slovak Academy of Sciences on the occassion of a jubilee; 28.05.2014

Other national awards

HLOUŠKOVÁ Zuzana	• Honorary Member of the Slovak Chemical Society; 2014
LACÍK Igor	• Crystal Wing 2015: a prestigious award at the national level for the contribution to Medicine and Science • Award by the Literature fund for the citation response in the category technical sciences and geosciences, 2013
OMASTOVÁ Mária	• The Medal of Daniel Bellus awarded by the Slovak Chemical Society; 2015 • The Medal of the Slovak Chemical Society; 2012 • Award by the Literature fund for the citation response in the category technical sciences and geosciences, 2012
ŠPITALSKÝ Zdenko	• Award by the Literature fund for the citation response in the category technical sciences and geosciences, 2014

International awards

CZANIKOVÁ Klaudia	• The poster price for the best poster at the internation conference ICPAC 2012 - The International Conference on Pure and Applied Chemistry, Maurícius, 2.-6.7. 2012
ILČÍKOVÁ Markéta	• The poster price for the best poster at the conference PLASTKO 2012, University Tomáš Baťa, Zlín, ČR, 11.-12.4.2012
NOVÁK Igor, POPELKA Anton	• 2nd prize Molecules Best Paper Award: Coauthors of publication Polysaccharides coatings on medical-grade PVC: A probe into surface characteristics and the extent of bacterial adhesion.“ In *Molecules*, 2010, vol. 15, p. 1007, award by the journal Molecules, 2014
Polymer Institute SAS	• Golden Medal for „Biologically degradable and compostable polymers with a high level of deformability”, 8th International Fair, Taipei International Invention Show and Technomart 2012

2.1.6. List of patents, patent applications, and other intellectual property rights registered abroad, incl. revenues

1. A PROCESS FOR PREPARATION OF COMPOSITE SORBENT FOR REMOVAL CONTAMINANTS FOR WATER
   Owner: Polymer Institute of the Slovak Academy of Sciences; Dúbravská cesta 9; 845 41 Bratislava 45; Slovakia
   WO/2015/122856; WO 20.08.2015; PCT/SK2015/050003
2. METHOD FOR CROSS-LINKING OF POLYMER FILMS
   Owner: Polymer Institute of the Slovak Academy of Sciences; Dúbravská cesta 9; 845 41 Bratislava 45; Slovakia
   WO/2014/209241; *WO* 31.12.2014; PCT/SK2014/050008
3. BIOLOGICALLY DEGRADABLE POLYMERIC COMPOSITION WITH HIGH DEFORMABILITY
   Owner: Polymer Institute of the Slovak Academy of Sciences; Dúbravská cesta 9; 845 41 Bratislava 45; Slovakia
   WO/2012/141660; *WO* 18.10.2012; PCT/SK2012/000004

Patent family:

Country	Application Date	Application No.	Publication Date	Date of grant
Canada	11.10.2013	CA 2833131	18.10.2012	
USA	11.10.2013	14/111,536	6.2.2014	
China	10.10.2013	201280017779.7	18.12.2013	
Japan	25.9.2013	2014-505108	1.5.2014	30.10.2015
Singapore	30.9.2013	2013073648	29.11.2013	
EURO_PCT	25.10.2013	EP 12720304.0-1302	26.3.2014	
Korea	14.10.2013	2013-7027069	22.4.2014	
Russia	8.11.2013	2013 149 900	20.5.2015	
India	22.10.2013	1978/MUMNP/2013	26.9.2014	

2.1.7. List of patents, patent applications, and other intellectual property rights registered in Slovakia, incl. revenues

Patent applications

1. Gumárenská zmes na báze polymérnej kompozície s obsahom nanoplniva
Rubber mixture based on polymer composition containing nano-filler
Application No.: 97-2015 / 27.11.2015; *Status:* in proceedings *MPT:* C08L 7/00
Owner: Polymer Institute of the Slovak Academy of Sciences; Dúbravská cesta 9; 845 41 Bratislava 45; Slovakia

2. Spôsob úpravy funkčného stavu ľubovoľnej mRNA umožňujúci jej selektívne a špecifické rozpoznanie
Method of modification of functional state of arbitrary mRNA enabling selective and specific recognition
Application No.:50065-2015 / 15.10.2015*; Status:* in proceedings *MPT:* C12N 5/00
Owner:
Polymer Institute of the Slovak Academy of Sciences; Dúbravská cesta 9; 845 41 Bratislava 45; Slovakia

3. Spôsob prípravy kompozitného sorbentu na odstraňovanie kontaminantov z vôd
Method of preparation of composite sorbent for removal of water contaminants
Application No.:50077-2014 / 15.12.2014; *Status:* in proceedings *MPT:* B01J 20/06
Owner: Polymer Institute of the Slovak Academy of Sciences; Dúbravská cesta 9; 845 41 Bratislava 45; Slovakia
Výskumný ústav vodného hospodárstva, Nábr.arm.gen.L.Svobodu 5, 812 49 Bratislava, SK
Centrum vedecko-technických informácií SR, Lamačská cesta 8/A, 811 04 Bratislava, SK

4. Spôsob prípravy strieborných nanočastíc vo vodnej polyakrylamidovej disperzii
Method of preparation of silver nanoparticles in water polyacrylamide dispersion
Application No.: 5015-2014 / 30.04.2014; *Status:* published *MPT:* C01G 5/00
Owner: Polymer Institute of the Slovak Academy of Sciences; Dúbravská cesta 9; 845 41 Bratislava 45; Slovakia

5. Spôsob prípravy kompozitnej polymérovej subnanometrovej disperzie na báze akrylamidu
Method of preparation of composite polymer sub-nanometer dispersion based on akrylamide
Application No.: 50060-2014 / 04.03.2014; *Status:* published *MPT:* C08J 3/28
Owner: Polymer Institute of the Slovak Academy of Sciences; Dúbravská cesta 9; 845 41 Bratislava 45; Slovakia

6. Spôsob prípravy kompozitného sorbentu na odstraňovanie kontaminantov z vôd
Method of preparation of composite sorbent for removal of water contaminants

Application No.: 50017-2014 / 13.02.2014; *Status:* published *MPT:* B01J 20/06
Owner:
Polymer Institute of the Slovak Academy of Sciences; Dúbravská cesta 9; 845 41 Bratislava 45; Slovakia
Výskumný ústav vodného hospodárstva, Nábr.arm.gen.L.Svobodu 5, 812 49 Bratislava, SK
Centrum vedecko-technických informácií SR, Lamačská cesta 8/A, 811 04 Bratislava, SK

7. Spôsob výroby nanopórovitého vláknitého uhlíka z celulózových prekurzorov
Method of preparation of nano-porous fibrous carbon from cellulose precursors
Application No.: *5003-2013 / 07.02.2013*; *Status:* published *MPT: D01F 9/10*
Owner: Polymer Institute of the Slovak Academy of Sciences; Dúbravská cesta 9; 845 41 Bratislava 45; Slovakia

Patent

1. Spôsob sieťovania filmov polymérov
Method for crosslinking of polymer films
Application No.: 50024-2013 / 28.06.2013; *No.:* 288328; *Legal status: valid MPT:* C08J 3/28
Owner: Polymer Institute of the Slovak Academy of Sciences; Dúbravská cesta 9; 845 41 Bratislava 45; Slovakia

Trademarks

1. GRAVIPOL
Application No.: 1698-2012 / 14.11.2012; Registration No*.:* 234768; *Legal status: valid*; Class: *ZTS:* 1, 16, 39
Owner:
Polymer Institute of the Slovak Academy of Sciences; Dúbravská cesta 9; 845 41 Bratislava 45; Slovakia
Centrum vedecko-technických informácií SR, Lamačská cesta 8/A, 811 04 Bratislava, SK

Utility model

1. Biologicky degradovateľná polymérna kompozícia so zlepšenými vlastnosťami
Biologically degradable polymer composition with improved properties
Application No.: 50134-2014 / 11.04.2011; Registration No*.:* 7317; *Legal status: valid MPT:* C08L 67/04
Owner: Polymer Institute of the Slovak Academy of Sciences; Dúbravská cesta 9; 845 41 Bratislava 45; Slovakia
License agreement signed on 30.9.2015
Provider: Polymer Institute of the Slovak Academy of Sciences
Transferee: PANARA, s.r.o.

2.1.8. Table of research outputs (as in annual reports).

Papers from international collaborations in large-scale scientific projects (Dwarf team, ALICE Collaboration, ATLAS collaboration, CD Collaboration, H1 Collaboration, HADES Collaboration, and STAR Collaboration) have to be listed separately.

Scientific publications	2012			2013			2014			2015			total			
	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	No. / FTE	No. / salary budget	number	averaged number per year	av. No. / FTE	av. No. / salary budget
Scientific monographs and monographic studies in journals and proceedings published abroad *(AAA, ABA)*	0,0	0,000	0,000	1,0	0,017	0,002	0,0	0,000	0,000	2,0	0,036	0,003	**3,0**	**0,8**	**0,013**	**0,001**
Scientific monographs and monographic studies in journals and proceedings published in Slovakia *(AAB, ABB)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	**0,0**	**0,0**	**0,000**	**0,000**
Chapters in scientific monographs published abroad *(ABC)*	3,0	0,051	0,005	1,0	0,017	0,002	2,0	0,033	0,003	5,0	0,090	0,008	**11,0**	**2,8**	**0,047**	**0,004**
Chapters in scientific monographs published in Slovakia *(ABD)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	**0,0**	**0,0**	**0,000**	**0,000**
Scientific papers published in journals registered in Current Contents Connect *(ADCA, ADCB, ADDA, ADDB)*	63,0	1,073	0,100	47,0	0,805	0,074	69,0	1,143	0,109	66,0	1,193	0,100	**245,0**	**61,3**	**1,052**	**0,096**
Scientific papers published in journals registered in Web of Science Core Collection and SCOPUS *(ADMA, ADMB, ADNA, ADNB)*	7,0	0,119	0,011	10,0	0,171	0,016	2,0	0,033	0,003	7,0	0,127	0,011	**26,0**	**6,5**	**0,112**	**0,010**
Scientific papers published in other foreign journals (not listed above) *(ADEA, ADEB)*	1,0	0,017	0,002	2,0	0,034	0,003	2,0	0,033	0,003	4,0	0,072	0,006	**9,0**	**2,3**	**0,039**	**0,004**
Scientific papers published in other domestic journals (not listed above) *(ADFA, ADFB)*	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	0,0	0,000	0,000	**0,0**	**0,0**	**0,000**	**0,000**
Scientific papers published in foreign peer-reviewed proceedings *(AEC, AECA)*	5,0	0,085	0,008	16,0	0,274	0,025	14,0	0,232	0,022	7,0	0,127	0,011	**42,0**	**10,5**	**0,180**	**0,016**
Scientific papers published in domestic peer-reviewed proceedings *(AED, AEDA)*	0,0	0,000	0,000	2,0	0,034	0,003	1,0	0,017	0,002	0,0	0,000	0,000	**3,0**	**0,8**	**0,013**	**0,001**
Published papers (full text) from foreign and international scientific conferences *(AFA, AFC, AFBA, AFDA)*	11,0	0,187	0,017	7,0	0,120	0,011	20,0	0,331	0,032	7,0	0,127	0,011	**45,0**	**11,3**	**0,193**	**0,018**
Published papers (full text) from domestic scientific conferences *(AFB, AFD, AFBB, AFDB)*	1,0	0,017	0,002	3,0	0,051	0,005	3,0	0,050	0,005	9,0	0,163	0,014	**16,0**	**4,0**	**0,069**	**0,006**

- **Supplementary information and/or comments on the scientific outputs of the institute.**

The number of publications has been stable during the assessed period with the average number of publications per year of 61. This means an increase by more than 10 publications per year in comparison with the previous assessment with 48 publications per year. The PI SAS management and Scientific board constantly discuss with the scientists the need to publish in high quality journals, where, although not necessarily, the quality and visibility of published work is expressed by the journal impact factor. With this respect, the average impact factor during the assessed period has steadily increased from 2.6 in the years 2010-2011 to current value of 3.1. This value is above the median for polymer sciences (1.63 in year 2015 according to the JCR). This formal statistics contains another positive feature that is the generation exchange during the last four years. Hence, the contribution of scientists from younger generation to the scientific outputs represents a good perspective for the PI SAS future.

Notice: List of all research outputs of monitored assessment period of structure of the Organisation's annual report is included in the separate annex

2.2. Responses to the research outputs (citations, etc.)

2.2.1. Table with citations per annum.

Citations of papers from international collaborations in large-scale scientific projects (Dwarf team, ALICE Collaboration, ATLAS collaboration, CD Collaboration, H1 Collaboration, HADES Collaboration, and STAR Collaboration) have to be listed separately.

Citations, reviews	2011		2012		2013		2014		total		
	number	No. / FTE	number	No. / FTE	number	No. / FTE	number	No. / FTE	number	averaged number per year	av. No. / FTE
Citations in Web of Science Core Collection (1.1, 2.1)	1161,0	19,775	1172,0	20,079	1451,0	24,031	1588,0	28,701	**5372,0**	**1343,0**	**23,077**
Citations in SCOPUS (1.2, 2.2) if not listed above	136,0	2,316	151,0	2,587	214,0	3,544	214,0	3,868	**715,0**	**178,8**	**3,071**
Citations in other citation indexes and databases (not listed above) (3.2,4.2,9,10)	0,0	0,000	0,0	0,000	0,0	0,000	0,0	0,000	**0,0**	**0,0**	**0,000**
Other citations (not listed above) (3, 4, 3.1, 4.1)	1,0	0,017	1,0	0,017	1,0	0,017	7,0	0,127	**10,0**	**2,5**	**0,043**
Reviews (5,6)	0,0	0,000	0,0	0,000	0,0	0,000	0,0	0,000	**0,0**	**0,0**	**0,000**

2.2.2. List of 10 most-cited publications, with number of citations, in the assessment period (2011 – 2014).

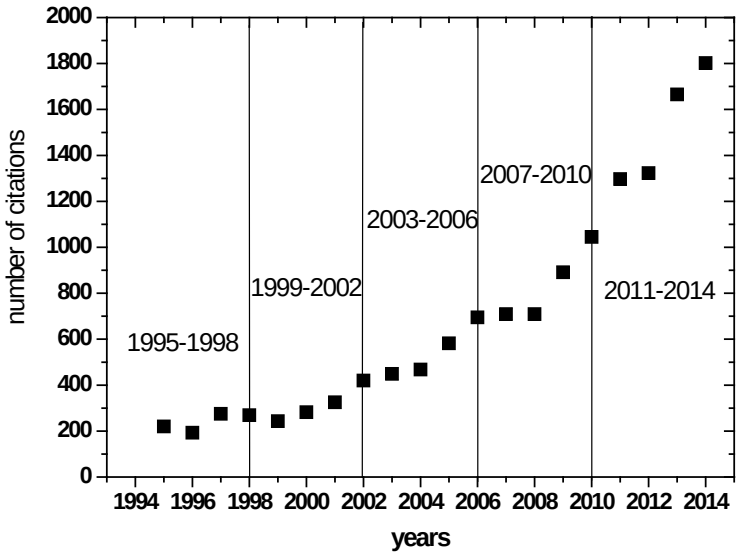
1. **ŠPITALSKÝ, Zdenko** - TASIS, Dimitrios - PAPAGELIS, Konstantinos - GALIOTIS, Costas. Carbon nanotube-polymer composites: Chemistry, processing, mechanical and electrical properties. In *Progress in Polymer Science : an International Review Journal*, 2010, vol. 35, p. 357 - 401. (23.753 - IF2009). (2010 - Current Contents). ISSN 0079-6700. **785 citations**
2. **CAPEK, Ignác**. Preparation of metal nanoparticles in water-in-oil (w/o) microemulsions. In *Advances in colloid and interface science*, 2004, vol. 110, no.1 - 2, p. 49 - 74. (4.057 - IF2003). ISSN 0001-8686. **186 citations**
3. **OMASTOVÁ, Mária** - TRCHOVÁ, M. - KOVÁŘOVÁ, J. - STEJSKAL, J. Synthesis and structural study of polypyrroles prepared in the presence of surfactants. In *Synthetic Metals*, 2003, vol. 138, no. 3, p. 447 - 455. (1.187 - IF2002). (2003 - Current Contents). ISSN 0379-6779. **147 citations**
4. ORIVE, G. - HERNANDEZ, R.M. - GASCON, A.R. - CALAFIORE, R. - CHANG, T.S.M. - DE VOS, P. - HORTELAO, G. - HUNKELER, D. - **LACÍK, Igor** - SHAPIRO, A.M.I. - PEDRAZ, J.L. Cell encapsulation: promise and progress. In *Nature medicine*, 2003, vol. 9, no. 1, p. 104 - 107. ISSN 1078-8956. **119 citations**
5. BLINOVA, Natalia V. - STEJSKAL, Jaroslav - TRCHOVÁ, Miroslava - PROKEŠ, Jan - **OMASTOVÁ, Mária**. Polyaniline and polypyrrole: a comparative study of the preparation. In *European Polymer Journal*, 2007, vol. 43, p. 2331 - 2341. (2.113 - IF2006). (2007 - Current Contents). ISSN 0014-3057. **87 citations**
6. ORIVE, G. - HERNANDEZ, R.M. - GASCON, A.R. - CALAFIORE, R. - CHANG, T.M.S. - DE VOS, P. - HORTELANO, G. - HUNKELER, D. **- LACÍK, Igor** - PEDRAZ, J.L. History, challenges and perspectives of cell microencapsulation. In *Trends in Biotechnology*, 2004, vol. 22, no.2, p. 87 - 92. ISSN 0167-7799. **79 citations**
7. **CAPEK, Ignác.** Degradation of kinetically-stable o/w emulsions. In *Advances in colloid and interface science*, 2004, vol. 107, no. 2 - 3, p. 125 - 155. (4.057 - IF2003). ISSN 0001-8686. **64 citations**
8. THOMASSIN, Jean-Michel **- KOLLÁR, Jozef** - CALDARELLA, Giuseppe - GERMAIN, Albert - JERÔME, Robert - DETREMBLEUR, Christophe. Beneficial effect of carbon nanotubes on the performances of Nafion membranes in fuel cell applications. In *Journal of Membrane Science*, 2007, vol. 303, p. 252-257. **59 citations**
9. VOS, Paul de - BUČKO, Marek - GEMEINER, Peter - NAVRÁTIL, Marián - ŠVITEL, Juraj - FAAS, Marijke - STRAND, Berit Lokensgard - SKJAK-BRAEK, Gudmund - MORCH, Yrr A. - VIKARTOVSKÁ, Alica, Welwardová - **LACÍK, Igor - KOLLÁRIKOVÁ, Gabriela** - ORIVE, Gorka - PONCELET, Dennis - PEDRAZ, Jose Luis - ANSORGE-SCHUMACHER, Marion B. Multiscale requirements for bioencapsulation in medicine and biotechnology. In *Biomaterials*, 2009, vol. 30, p. 2559 - 2570. (6.646 - IF2008). (2009 - Current Contents). ISSN 0142-9612. **59 citations**
10. RATZSCH, M. - ARNOLD, M. - **BORSIG, Eberhard** - BUCKA, H. - REICHELT, N. Radical reactions on polypropylene in the solid state. In *Progress in Polymer Science: an International Review Journal*, 2002, vol. 27, no. 7, p. 1195 - 1282. ISSN 0079-6700. **56 citations**

2.2.3. List of most-cited authors from the Institute (at most 10 % of the research employees with university degree engaged in research projects) and their number of citations in the assessment period (2011– 2014).

1. Mária OMASTOVÁ 996 citations
2. Zdenko ŠPITÁLSKÝ 935 citations
3. Igor LACÍK. 826 citations
4. Ignác CAPEK 648 citations
5. Igor KRUPA 520 citations
6. Ivan CHODÁK 482 citations

- **Supplementary information and/or comments on responses to the scientific output of the institute.**

The number of citations of PI SAS increases over the years for the last 20 years. This development is logical in the view of continuously increased number of publications by PI SAS scientists. Nevertheless, the trend of increased number of citations of the publications published in recent years indicates that the research outputs produced at PI SAS are of interest to the scientific community.



The number of citations (from WOS and Scopus) in the period from 1995 till 2014

2.3. Research status of the institute in international and national contexts

- **International/European position of the institute**

2.3.1. List of the most important research activities demonstrating the international relevance of the research performed by the institute, incl. major projects (details of projects should be supplied under Indicator 2.4). Max. 10 items.

1. Project ERDF **Innovative value chain development for sustainable plastics in Central Europe;** registration number: 3C368P1 ERDF; duration of the project: 04.2011-03.2014; **Chodák Ivan** – principal investigator from the Polymer Institute of SAS; coordinator: Chemijski institut Ljubljana, Slovenia
2. Project ERDF **POLYFRIEND - Advanced bio-friendly polymers;** registration number: HUSK/1101/1.2.1/0209; duration of the project: 10.2012-09.2014; **Mosnáček Jaroslav** - coordinator from the Polymer Institute SAS of SAS; partner: Hungarian Academy of Sciences
3. Project JDRF **Multicomponent microcapsules for allogeneic islet transplantation in a comprehensive, preclinical non-human primate model;** registration number: JDRF 2-SRA-2014-288-Q-R; duration of the project: 11.2014-10.2017; **Lacík Igor** – principal investigator from the Polymer Institute of SAS; coordinator: University of Illinois, Chicago, USA
4. Project NT-ERA.Net **Applications of polymer nanocomposites with low content of graphene in electronic devices;** registration number: ID 794; duration of the project: 01.2012-12.2014, **Špitalský Zdenko** – principal investigator from the Polymer Institute of SAS; coordinator: West Pomerian University, Szczeczin
5. Project M-ERA.Net Transnational Call 2013 **M2Neural: Multifunctional Materials for advanced Neural interfaces;** registration number: --; duration of the project: 11.2014-10.2017; **Lacík Igor** – principal investigator from the Polymer Institute of SAS; coordinator: Scuola Superiore Sant'Anna, Italy
6. Project 7th FP EU **Low temperature heat exchangers based on thermally conducting polymers nanocomposites** (Acronym: THERMONANO; subprogram: Energy; type of project: Collaborative Project - Large;)**;** registration number: 227407; duration of the project: 01.2009-06.2012; **Chodák Ivan** – principal investigator from the Polymer Institute of SAS; coordinator: Politecnico di Torino, Italy
7. Project 7th FP EU **Nano-optical mechanical systems** (Acronym: NOMS; subprogram: NMP; type of project: Collaborative Project - Small)**;** registration number: Stage 1 CP-FP 228916-1; duration of the project: 09.2009-08.2012; **Krupa Igor** – principal investigator from the Polymer Institute of SAS; coordinator: Agencia Estatal Consejo Superior de Investigaciones Científicas, Spain
8. Project 7th FP EU **Strategy for the preservation of plastics artefacts in museums collections** (Acronym: POPART; subprogram: Environment 2007.3.2.1.1. Damage assessment, diagnosis and monitoring for the preventive conservation and maintenance of the cultural heritage; type of project: Collaborative Project Small or Medium-Scale Focused Research Project)**;** registration number: 031867; duration of the project: 10.2008-03.2012; **Rychlý Jozef** – work package leader from the Polymer Institute of SAS; coordinator: Centre de Recherche sur la Conservation des Collections, France
9. Project JRP **Photovoltaic and sensor properties of plasma and chemical functionalized graphene and carbon nanotubes;** registration number: SAS-TÜBİTAK JRP 2014/2; duration of the project: 12.2014-11.2017; **Omastová Mária** – coordinator from the Polymer Institute of SAS; coordinators: Polymer Institute of SAS and Süleyman Demirel University, Faculty of Arts and Science Department of Chemistry Isparta, Turkey
10. Project JRP **Synthesis of well-defined novel copolymers by use of living polymerization methods and advanced chromatography techniques;** registration number: SAS-MOST Taiwan JRP 2014; duration of the project: 01.2015-12.2017; **Mosnáček Jaroslav** – coordinator from the Polymer Institute of SAS

2.3.2. List of international conferences (co)organised by the institute.

1. **4th Bratislava Young Polymer Scientists Workshop BYPoS**; October 1-5, 2012; Relax Hotel Avena – Liptovský Ján, Slovak Republic; responsible person: **Podhradská Silvia;** number of participants: 38
2. **5th International Conference Polymeric Materials in Automotive & 21st Slovak Rubber Conference;** April 23-25, 2013; Hotel Bonbón - Bratislava, Slovak Republic, responsible person: **Chodák Ivan;** number of participants: 169
3. **10th Anniversary Meeting EUROFILLERS 2013 (Eurofillers 2013);** August 25-29, 2013; Hotel Park Inn, Bratislava, Slovak Republic; responsible person: **Omastová Mária;** number of participants: 170
4. **6th European Weathering Symposium EWS**; September 11-13, 2013; Hotel Park Inn, Bratislava, Slovak Republic; responsible person: **Rychlá Lyda**; number of participants: 100
5. **POLYFRIEND Educational Course and Workshop;** September 5, 2013; Polymer Institute of SAS, Bratislava, Slovak Republik; responsible person: **Mosnáček Jaroslav**; number of participants: 50
6. **5th Bratislava Young Polymer Scientists Workshop BYPoS;** June 16-20, 2014; Zázrivá, Slovak Republic; responsible person: **Šišková Alena**; number of participants: 40
7. **XXII. International Conference on Bioencapsulation;** September 17-19, 2014; Hotel Holiday Inn Bratislava, Slovak Republic; responsible person: **Lacík Igor;** number of participants: 120
8. **12th International Seminar on Elastomers ISE´14;** August 24-27, 2014;Hotel Park Inn, Bratislava, Slovak Republic; responsible person: **Chodák Ivan**; number of participants: 110
9. **International Conference on Bio-Friendly Polymers and Polymer Additives: From Scientific Aspects to Processing and Applications BPPA14**; May 19-21, 2014; Research Centre for Natural Sciences of the Hungarian Academy of Sciences in Budapest; responsible person: **Mosnáček Jaroslav**; number of participants: 110
10. **6th International Conference Polymeric Materials in Automotive & 22nd Slovak Rubber Conference;** May 26-28, 2015; Hotel Park Inn, Bratislava, Slovak Republic; responsible person: **Chodák Ivan;** number of participants: 119
11. **EUPOC 2015 Conducting polymeric materials;** May 24 -28, 2015; Palazzo Feltrinelli Lake Garda, Gargnano, Italy; responsible person: **Omastová Mária;** number of participants: 85

2.3.3. List of edited proceedings from international scientific conferences.

1. POLYMÉRY 2012 - VII. Slovensko - Česká konferencia organizovaná pri príležitosti 50-teho výročia založenia Ústavu polymérov SAV: (Slovak-Czech conference organized on the 50th anniversary of PI SAS): Smolenice, 26.11. - 30. 11. 2012: program a zborník príspevkov. Bratislava : Ústav polymérov SAV, 2012. ISBN 978-80-970923-0-6.
2. BYPOS 2012: Bratislava Young Polymer Scientists Workshop: Liptovský Ján, Slovakia, October 1 - 5, 2012: programme and book of abstracts. Bratislava: the Young Scientists Council of Polymer Institute of the Slovak Academy of Sciences, 2012. ISBN 978-80-970923-2-0.
3. EUROFILLERS 2013: 10th anniversary meeting: Bratislava, Slovakia, August 25 - 29, 2013: book of abstracts. Bratislava, Slovakia: Polymer Institute of SAS, Bratislava, 2013. ISBN 978-80-970923-3-7.
4. BYPOS: 5th Bratislava Young Polymer Scientists Workshop: Zázrivá, Slovakia, June 16th - 20th, 2014: workshop book. Bratislava: Young Scientists Council of Polymer Institute of the Slovak Academy of Sciences, 2014. ISBN 978-80-970923-5-1.

5. ISE ´14: 14th International Seminar on Elastomers: Bratislava, Slovakia, August 24th - 28th, 2014: book of abstracts. Bratislava, Slovakia: Polymer Institute of SAS, 2014. ISBN 978-80-970923-6-8.

2.3.4. List of journals edited/published by the institute:

2.3.4.1. WOS (IF of journals in each year of the assessment period)

2.3.4.2. SCOPUS

2.3.4.3. other databases

2.3.4.4. not included in databases

- **National position of the institute**

2.3.5. List of selected projects of national importance

1. Project EU SF Central of applied investigation of nanoparticles; registration number: NFP26240220017; duration of the project: 09.2009-12.2012; Capek Ignác - principal investigator from Polymer Institute of SAS; coordinator: Institute of Physics SAS, Bratislava
2. Project EU SF Adjusting the product portfolio of VIPO; registration number: 26220220091 OP VaV-2009/2.2/03-SORO; duration of the project: 02.2010-02.2013/06.2014; Chodák Ivan - principal investigator from the Polymer Institute of SAS; coordinator: VIPO a.s., Partizánske
3. Project EU SF Centre for materials, layers and systems for applications and chemical processes under extreme conditions – Stage II; registration number: ITMS code 26240120021; duration of the project: 04.2010–03.2012; Danko Martin, Chodák Ivan, Mosnáček Jaroslav, Omastová Mária, Podhradská Silvia, Rychlý Jozef, Stach Marek - principal investigators from the Polymer Institute of SAS; coordinator: Institute of Inorganic Chemistry SAS Bratislava
4. Project EU SF Research on application potential of renewable and recycled materials and information technologies in rubber industry; registration number: code 828524, OPVaV-2011/2.2/07-SORO; duration of the project: 07.2012–05.2015; Chodák Ivan - principal investigators from the Polymer Institute of SAS; coordinator: VIPO, a.s., Partizánske
5. Project EU SF Centre for applied research of new materials and technology transfer; registration number: code ITMS of project 262 402 200 88; duration of the project: 09.2013-08.2015; Omastová Mária - principal investigators from the Polymer Institute of SAS; coordinator: Presidium of SAS, Bratislava
6. Project SRP Testing the applicability of developed biodegradable material for injection – molding technology and preparation of material for pilot tests aimed to technology transfer; registration number: no. 2012-16023/44330:1-11; duration of the project: 12.2012-03.2013; Chodák Ivan – principal investigator from the Polymer Institute of SAS; coordinator: Slovak Plastic Claster, Nitra
7. Project CE GLYKOMED Research on medicinally significant saccharide derivatives; registration number: CE SAS acronym Glycomed; duration of the project: 02.2009- 01.2013; Kronek Juraj - principal investigator from the Polymer Institute of SAS; coordinator: Institute of Chemistry SAS, Bratislava
8. Project CE FUN-MAT Center of excellence for functionalized multiphase materials; registration number: CE SAS acronym FUN-MAT; duration of the project: 08.2011-07.2015; Mosnáček Jaroslav - principal investigator from the Polymer Institute of SAS; coordinator: Institute of Physics SAS, Bratislava

2.3.6. Projects of the Slovak Research and Development Agency (APVV)

1. Project APVV LIVICOP: Living/controlled polymerizations: Optimization of polymerization process toward well-defined polymers with targeted architecture and properties; registration number: APVV-0109-10; duration of the project: 05.2011-10.2014; Mosnáček Jaroslav – coordinator
2. Project APVV Biodecorated composite magnetic nanoparticles: Preparation, collective properties and applications, registration number: APVV-0125-11; duration of the project: 07.2012-12.2015; Capek Ignác – coordinator
3. Project APVV DIASOLVE: Advanced polymer technologies in biomedicine: Polymer microcapsules for immunoprotection of transplanted pancreatic islets in diabetes treatment; registration number: APVV-0486-10; duration of the project: 05.2011-10.2014; Lacík Igor - coordinator
4. Project APVV Nanostructure in macromolecular systems induced by confinement; registration number: APVV-0451-11; duration of the project: 07.2012 – 12.2015; Cifra Peter – coordinator
5. Project APVV METALLOCENE: Unreactive melt adhesives based on metallocene polymers for industrial applications; registration number: APVV-14-0566; duration of the project: 07.2015-12.2019; Chodák Ivan – coordinator
6. Project APVV MEDERIT: Materials and processes for functional encapsulation of pancreatic islets in diabetes treatment; registration number: APVV-14-0858; duration of the project: 07.2015-06.2019; Lacík Igor – coordinator
7. Project APVV GONanoplatform: Graphene-based nanoplatform for detection of cancer; registration number: APVV-14-0120; duration of the project: 07.2015-06.2019; Omastová Mária – coordinator
8. Project APVV PLAZTEXNANO: Research of the impact of low temperature PLASma on increase the surface treatment permanence of TEXtile materials using NANOsols; registration number: APVV-14-0518; duration of the project: 07.2015-06.2019; Špitalský Zdenko – coordinator
9. Project APVV NANOBIOROZ: Preparation of nanostructured interphases, their integration with bioelements and subsequent use; registration number: APVV-0282-11; duration of the project: 07.2011-12.2015; Mosnáček Jaroslav – principal investigator from the Polymer Institute of SAS; coordinator: Institute of Chemistry of SAS, Bratislava
10. Project APVV CA(IX)NCER: Carbonic anhydrase IX as a functional component of cancer progression: the role in epithelial-mesenchymal transition and intercellular signaling; registration number: APVV-0658-11; duration of the project: 07.2012-12.2015; Lacík Igor – principal investigator from the Polymer Institute of SAS; coordinator: Institute of Virology of SAS, Bratislava

2.3.7. Projects of the Scientific Grant Agency of the Slovak Academy of Sciences and the Ministry of Education (VEGA)

1. Project VEGA Two-dimensional liquid chromatography of complex polymer systems; registration number: 2/0001/12; duration of the project: 01.2012- 12.2014; Berek Dušan - coordinator
2. Project VEGA Simulations of folding and aggregation in polypeptides; registration number: 2/0079/12; duration of the project: 01.2012-12.2015; Bleha Tomáš - coordinator
3. Project VEGA Structural transitions of confined semi-flexible macromolecules; registration number: 2/0093/12; duration of the project: 01.2012-12.2015; Cifra Peter - coordinator
4. Project VEGA Tailor made materials prepared by "living" free radical polymerization, crosslinking and grafting; registration number: 2/0072/11; duration of the project: 01.2011-12.2013; Chmela Štefan – coordinator

5. Project VEGA Multiphase polymeric systems with special properties; registration number: 2/0185/10; duration of the project: 01.2010-12.2012; Chodák Ivan – coordinator
6. Project VEGA Specification of degradation conditions for the least stable polymers used in the museum artefacts and the effect of light, heat, humidity and oxygen; registration number: 2/0147/12; duration of the project: 01.2012-12.2014; Janigová Ivica – coordinator
7. Project VEGA Modified polymer surfaces for biomedical application; registration number: 2/0151/12; duration of the project: 01.2012- 12.2014; Kronek Juraj – coordinator
8. Project VEGA Graphene containing polymer nanocomposites for environmental monitoring; registration number: 2/0119/12; duration of the project: 01.2012-12.2015; Krupa Igor/Špitalský Zdenko – coordinators
9. Project VEGA Photosensitive biodegradable polymer materials; registration number: 2/0074/10; duration of the project: 01.2010-12.2012; Mosnáček Jaroslav – coordinator
10. Project VEGA Electrically conductive polymeric nanocomposites with modified fillers; registration number: 2/0064/10; duration of the project: 01.2010-12.2012; Omastová Mária - coordinatorS
11. Project VEGA Mechanism and kinetics of radical polymerization in aqueous phase: rate constants of propagation for cationic monomers; registration number: 2/0160/12; duration of the project: 01.2012-12.2014; Stach Marek/Uhelská Lucia – coordinators
12. Project VEGA Graphene containing polymer nanocomposites for environmental monitoring; registration number: 2/0119/12; duration of the project: 01.2012-12.2015; Špitalský Zdeno - coordinator from the Polymer Institute of SAS
13. Project VEGA Photochemically active systems and probes for polymer research; registration number: 2/0112/13; duration of the project: 01.2013-12.2016; Danko Martin - coordinator from the Polymer Institute of SAS
14. Project VEGA Biodegradable polymers for agricultural applications and food packaging; registration number: 2/0167/14; duration of the project: 01.2014-12.2017; Kollár Jozef - coordinator
15. Project VEGA Kinetics and bioapplications of zwitterionic polymers; registration number: 2/0198/14; duration of the project: 01.2014- 12.2016; Lacík Igor – coordinator
16. Project VEGA Investigation of surface, adhesive and antibacterial properties of selected medicinal polymers modified by low-temperature plasma; registration number: 2/0199/14; duration of the project: 01.2014- 12.2016; Novák Igor – coordinator
17. Project VEGA Polymeric nanocomposites and hybrids and their applications as sensors and actuators**;** registration number: 2/0149/14; duration of the project: 01.2014-12.2017; Omastová Mária - coordinator
18. Project VEGA Pre-oxidation of polymers on their route to biodegradation; registration number: 2/0122/15; duration of the project: 01.2015-12.2017; Janigová Ivica – coordinator
19. Project VEGA Polymers based on 2-oxazolines for targeted drug delivery and controlled cell adhesion; registration number: 2/0163/15; duration of the project: 01.2015- 12.2017; Kronek Juraj - coordinator
20. Project VEGA Modelling and synthesis of hybrid conjugated systems for anticancer therapy; registration number: 2/0094/15; duration of the project: 01.2014-12.2018; Rázga Filip - coordinator

2.3.8. Projects of SAS Centres of Excellence

1. Project CE GLYKOMED Research on medicinally significant saccharide derivatives; registration number: CE SAS acronym Glycomed; duration of the project: 02.2009- 01.2013; Kronek Juraj - principal investigator from the Polymer Institute of SAS; coordinator: Institute of Chemistry SAS, Bratislava

2. Project CE FUN-MAT Center of excellence for functionalized multiphase materials; registration number: CE SAS acronym FUN-MAT; duration of the project: 08.2011-07.2015; Mosnáček Jaroslav - principal investigator from the Polymer Institute of SAS; coordinator: Institute of Physics SAS, Bratislava

2.3.9. National projects supported by EU Structural Funds

1. Project EU SF Central of applied investigation of nanoparticles; registration number: NFP26240220017; duration of the project: 09.2009-12.2012; Capek Ignác - principal investigator from Polymer Institute of SAS; coordinator: Institute of Physics SAS, Bratislava
2. Project EU SF Adjusting the product portfolio of VIPO; registration number: 26220220091 OP VaV-2009/2.2/03-SORO; duration of the project: 02.2010-02.2013/06.2014; Chodák Ivan - principal investigator from the Polymer Institute of SAS; coordinator: VIPO a.s., Partizánske
3. Project EU SF Centre for materials, layers and systems for applications and chemical processes under extreme conditions – Stage II; registration number: ITMS code 26240120021; duration of the project: 04.2010–03.2012; Danko Martin, Chodák Ivan, Mosnáček Jaroslav, Omastová Mária, Podhradská Silvia, Rychlý Jozef, Stach Marek - principal investigators from the Polymer Institute of SAS; coordinator: Institute of Inorganic Chemistry SAS Bratislava
4. Project EU SF Research on application potential of renewable and recycled materials and information technologies in rubber industry; registration number: code 828524, OPVaV-2011/2.2/07-SORO; duration of the project: 07.2012–05.2015; Chodák Ivan - principal investigators from the Polymer Institute of SAS; coordinator: VIPO, a.s., Partizánske
5. Project EU SF Centre for applied research of new materials and technology transfer; registration number: code ITMS of project 262 402 200 88; duration of the project: 09.2013-08.2015; Omastová Mária - principal investigators from the Polymer Institute of SAS; coordinator: Presidium of SAS, Bratislava

2.3.10. List of journals (published only in the Slovak language) edited/published by the institute:

2.3.10.1. WOS (IF of journals in each year of the assessment period)

2.3.10.2. SCOPUS

2.3.10.3. Other databases

2.3.10.4. Not included in databases

- ## Position of individual researchers in an international context

2.3.11. List of invited/keynote presentations at international conferences, as documented by programme or invitation letter

1. FLORIÁN, Štepán - NOVÁK, Igor - SYSEL, P. - POPELKA, Anton - ŠPÍRKOVÁ, M. - KLEINOVÁ, Angela. Povrchové vlastnosti polyimid-polysiloxánových blokových kopolymérov. In Sborník příspěvku konference PLASTKO 2012: Zlín - ČR, 11.-12. 4. 2012 [elektronický zdroj]. 1. vyd. - Zlín, ČR: Univerzita Tomáše Bati, 2012, p. [135 - 143]. ISBN 978-80-7454-137-7.
2. FLORIÁN, Štepán - NOVÁK, Igor - POPELKA, Anton - CHODÁK, Ivan - ŠPÍRKOVÁ, M. - CHEHIMI, M. M. - KLEINOVÁ, Angela. Surface properties of poly (ethylene terephthalate) modified by barrier plasma. In CCT 2012: 43rd International conference on coatings technology: Pardubice, Czech Republik, May 14-17, 2012: conference proceedings. - Pardubice: Univerzita Pardubice, 2012, p. 107-116. ISBN 978-80-7395-490-1.
3. LACÍK, Igor.Polymeric materials in diabetes treatment and monitoring, immobilization biotechnologies and non-biofouling surfaces, BASF Research Seminar 2012, St. Martin, Germany, 23. - 26.9. 2012

4. LACÍK, Igor - ROKSTAD, A. - KOLLÁRIKOVÁ, Gabriela - STEINKJER, B. - ESPEVIK, T. - KASÁK, Peter - SEMAK, V. - TREĽOVÁ, Dušana - SOBOLČIAK, Patrik. Microcapsules for immunoprotection of transplanted islets in diabetes. In 27th Congress of the Federation of the International Danube Symposia on Diabetes Mellitus : Budapest, Hungary, 28 - 30 June 2012 : abstract book. - Budapest, Hungary : Hungarian Diabetes Association, 2012, p. 26.

5. NOVÁK, Igor - POPELKA, Anton - LEHOCKÝ, M. - CHODÁK, Ivan - BÍLEK, F. Antibakteriálna úprava polyetylénu nízkoteplotnou plazmou. In Sborník příspěvku konference PLASTKO 2012: Zlín - ČR, 11.-12. 4.2012 [elektronický zdroj]. 1. vyd. - Zlín, ČR: Univerzita Tomáše Bati, 2012, p. 161-168. ISBN 978-80-7454-137-7.

6. NOVÁK, Igor - POPELKA, Anton - LEHOCKÝ, M. - CHODÁK, Ivan - BÍLEK, F. - KLEINOVÁ, Angela. Multistep method of polyethylene modification by atmospheric discharge plasma. In CCT 2012: 43rd International conference on coatings technology: Pardubice, Czech Republik, May 14-16, 2012: conference proceedings. - Pardubice: Univerzita Pardubice, 2012, p. 297-304. ISBN 978-80-7395-490-1.

7. NOVÁK, Igor - POPELKA, Anton - LEHOCKÝ, M - SEDLIAČIK, J - MATYAŠOVSKÝ, J - CHODÁK, Ivan - KLEINOVÁ, Angela. Anti-bacterially pre-treated polyethylene by discharge plasma. In Annals of Warsaw University of Life Sciences - SGGW: Forestry and Wood Technology, 2012, no. 79, p. 84-92. ISSN 1898-5912.

8. NOVÁK, Igor - POPELKA, Anton - KRUPA, Igor - CHODÁK, Ivan - SEDLIAČIK, J. - VALENTIN, Marian - KLEINOVÁ, Angela - JURKOVIČ, P. Modification of polyethyleneby radio-frequency plasma and silanes. In Annals of Warsaw University of Life Sciences - SGGW: Forestry and Wood Technology, 2012, no. 79, p. 75-83. ISSN 1898-5912.

9. NOVÁK, Igor - POPELKA, Anton - SEDLIAČIK, J. - VALENTIN, Marian - CHODÁK, Ivan - KLEINOVÁ, Angela - VANKO, V - PREŤO, J. Surface properties of polyethylene pre-treated by low-temperature plasma. In Annals of Warsaw University of Life Sciences - SGGW: Forestry and Wood Technology, 2012, no. 79, p. 67-74. ISSN 1898-5912.

10. OMASTOVÁ, Mária - CZANIKOVÁ, Klaudia - MIČUŠÍK, Matej - KASÁK, Peter - CHORVÁT, D Jr. - KRUPA, Igor. Actuating elastomeric composites containing multiwall carbon nanotubes. In 7th International Conference on Nanostructured Polymers and Nanocomposites: Prague - Czech Republic, April 24-27, 2012: book of abstracts. - Prague - Czech Republik: Institute of Macromolecular Chemistry, 2012, p. [2]. ISBN 978-80-85009-71-2.

11. BEREK, Dušan. Molecular characterization of complex polymer systems by means of advanced liquid chromatography techniques. In International Conference of Rubber and Rubber-like Materials, ICRRM 2013, Kharagpur, India, book of abstracts p. 39-40.

12. CZANIKOVÁ, Klaudia - KRUPA, Igor - OMASTOVÁ, Mária. Actuations of nanocomposites containing carbon nanotubes. In EPF 2013: European Polymer Congress: Pisa, Italy, June 16 - 21, 2013: book of abstract. - Pisa, Italy: European Polymer Federation, 2013, p. [IL7-5].

13. CHODÁK, Ivan - KRAJČI, Juraj. Determination of structure of reinforcing filler network by electrical conductivity of the polymer/carbon black composite. In EUROFILLERS 2013: 10th anniversary meeting: Bratislava, Slovakia, August 25 - 29, 2013: book of abstracts. - Bratislava, Slovakia: Polymer Institute of SAS, Bratislava, 2013, p. 85. ISBN 978-80-970923-3-7.

14. KASÁK, Peter - SOBOLČIAK, Patrik - SEMAK, Vladislav - STACH, Marek - KRONEKOVÁ, Zuzana - KOLLÁRIKOVÁ, Gabriela - KRUPA, Igor - CHORVÁT, D. Jr. - LACÍK, Igor. Zwitterionic polymers: kinetics, characterization and biomedical applications. In Australian - Slovenian Polymer Meeting - ASPM 2013, 3-5 April 2013, Bled, Slovenia: el. zbornik. - Ljubljana, Slovenia: Centre of Excellence PoliMat, 2013, p. 17. ISBN 978-961-269-992-5.

15. LACÍK, Igor - KASÁK, Peter - SEMAK, Vladislav - KOLLÁRIKOVÁ, Gabriela - SOBOLČIAK, Patrik - KRONEKOVÁ, Zuzana - UČŇOVÁ, Lucia - TREĽOVÁ, Dušana - STEINKJER, B. - ESPEVIK, T. - ROKSTAD, A. M. Microcapsule design for encapsulation of islets of Langerhans: An ongoing effort. In XXI International Conference on Bioencapsulation: Berlin,

Germany, August 28 -30, 2013: abstract book. - Berlin, Germany: TU Berlin, Bioencapsulation Research Group, 2013, p. 68 - 69.

16. LACÍK, Igor. Microcapsules for cell encapsulation. 12th International Conference on Polymers for Advanced Technologies, 29.9.-2.10.2013, Berlin, Germany. In Polymers for Advanced Technologies, 2013, vol. 24, suppl. 1, p. 30. (1.635 - IF2012). ISSN 1042-7147.
17. MIČUŠÍK, Matej - MOSNÁČKOVÁ, Katarína - FEDORKO, P. - CHEHIMI, M. M. - OMASTOVÁ, Mária. Conductive textiles: Formation, properties, and stability. In Modern Polymeric Materials for Environmental Applications: 5th International Seminar including COST Mp1105 Workshop: Kraków, Poland, 15 - 17 May 2013. - Kraków, Poland: Wydawnictwo Naukowo-Techniczne TEZA, 2013, vol.5, iss. 2, P. 63 - 70. ISBN 978-83-930641-2-0.
18. NOVÁK, Igor - POPELKA, Anton - LEHOCKÝ, M. - CHODÁK, Ivan - MATYAŠOVSKÝ, J. - JURKOVIČ, P. Bacterial adhesion assessment of atmospheric plasma modified polyethylene. In Annals of Warsaw University of Life Sciences - SGGW: Forestry and Wood Technology, 1st International Conference on Wood Composites, Modification and Machining: Kiry, Koscielisko, Poland, 17 – 19 September, 2013 - Kiry, Poľsko: Conference Center Kiry, 2013, no. 81, p. 157 - 161. ISSN 1898-5912.
19. NOVÁK, Igor - POPELKA, Anton - SEDLIAČIK, J. - CHODÁK, Ivan - KLEINOVÁ, Angela - JURKOVIČ, P. Surface properties of oak wood treated by barrier discharge plasma. In Annals of Warsaw University of Life Sciences - SGGW: Forestry and Wood Technology, 1st International Conference on Wood Composites, Modification and Machining: Kiry, Koscielisko, Poland, 17 – 19 September, 2013 - Kiry, Poľsko: Conference Center Kiry, 2013, no. 81, p. 162 - 165. ISSN 1898-5912.
20. NOVÁK, Igor - POPELKA, Anton - CHODÁK, Ivan - SEDLIAČIK, J. - VANKO, V. - PREŤO, J. Pre-treatment of beech wood by radio-frequency plasma. In Annals of Warsaw University of Life Sciences - SGGW: Forestry and Wood Technology, 1st International Conference on Wood Composites, Modification and Machining: Kiry, Koscielisko, Poland, 17 – 19 September, 2013 - Kiry, Poľsko: Conference Center Kiry, 2013, no. 81, p. 166 - 169. ISSN 1898-5912.
21. NOVÁK, Igor - CHODÁK, Ivan - SEDLIAČIK, J. - VANKO, V. - MATYAŠOVSKÝ, J. - ŠIVOVÁ, Mária. Pre-treatment of beech wood by cold plasma. In Annals of Warsaw University of Life Sciences - SGGW: Forestry and Wood Technology, 27th International Conference „Wood – the Material of 21th Century“: Warsaw (Rógow), Poland, 18 – 20 November, 2013 - Rógow, Poľsko: Conference Center Rógow, 2013, no. 83, p. 288-291. ISSN 1898-5912.
22. NOVÁK, Igor - POPELKA, Anton - CHODÁK, Ivan - SEDLIAČIK, J. - PREŤO, J. – PRACHÁR, Jozef - CHEHIMI, M. M. - ŠIVOVÁ, Mária. Modification of polyester-based foil by cold plasma for furniture applications. In Annals of Warsaw University of Life Sciences - SGGW: Forestry and Wood Technology, 27th International Conference „Wood – the Material of 21th Century“: Warsaw (Rógow), Poland, 18 – 20 November, 2013 - Rógow, Poľsko: Conference Center Rógow, 2013, no. 83, p. 283 - 287. ISSN 1898-5912.
23. NOVÁK, Igor - POPELKA, Anton - SEDLIAČIK, J. - CHODÁK, Ivan - VANKO, V.– TÓTH, A. - JURKOVIČ, P. - PRACHÁR, Jozef - ŠIVOVÁ, Mária. Modification of polyamide foil by diffuse coplanar barrier discharge plasma for furniture applications. In Annals of Warsaw University of Life Sciences - SGGW: Forestry and Wood Technology, 27th International Conference „Wood – the Material of 21th Century“: Warsaw (Rógow), Poland, 18 – 20 November, 2013 - Rógow, Poľsko: Conference Center Rógow, 2013, no. 83, p. 292 - 296. ISSN 1898-5912.
24. BEREK, Dušan. Size exclusion chromatography - A blessing and curse of polymer science and technology. In IMTCE 2014 : 9th International Materials Technology Conference & Exhibition :Kuala Lumpur, Malaysia, 13th - 16th May, 2014 : ISAPM 2014 : International Symposium on Advanced Polymeric Materials 2014 : programme book. - Kuala Lumpur, Malaysia : Institute of Materials, 2014, p. 87.
25. BEREK, Dušan. Comprehensive molecular characterization of multicomponent polymer systems by liquid chromatography, International Symposium MACRO IUPAC 2014, Chiang Mai, Thailand, 6.-11.7.201, abstrakt I-3, p. 14

26. BENKOVÁ, Zuzana - RAČKO, Dušan - BLEHA, Tomáš - CIFRA, Peter. Confined semiflexible macromolecules: Linear and ring DNA in nanochannels. In Thermodynamics of Complex Fluids and Interfaces : 5th US-Poland Workshop : Warsaw, Poland, June 11-13, 2014 : book of abstracts. - Warsaw, Poland : The University of Warsaw, 2014, p. 20-21.
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2014: Asian Workshop on Polymer Processing, November 17-19, 2014, Kenting, Taiwan, IL - I2 #1171.

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2.3.12. List of researchers who served as members of the organising and/or programme committees

1. **Berek Dušan**
   - member of the permanent programme committees of the conferences Polychar, Denton, Texas, USA
   - member of the international programme committees of Symposia about the sciences of separation, Dubrovník 2012, Poreč 2013, Croatia
2. **Csomorová Katarína**
   - secretary of the organizing committees of the 5th International Conference Polymeric Materials in Automotive PMA 2013& 21st Slovak Rubber Conference 2013, April 2013, Hotel Bonbon, Bratislava and the 6th International Conference Polymeric Materials in Automotive PMA 2015& 22nd Slovak Rubber Conference 2015, May 2015, hotel Park Inn Danube, Bratislava, Slovak Republic
   - secretary of the organizing committee of the 14th International Seminar on Elastomers, ISE´14, August 2014, Hotel Park Inn Danube Bratislava, Slovak Republic
3. **Danko Martin**
   - member of the programme committee of the Workshop POLYFRIEND, September 2013, Polymer Institute of SAS, Bratislava, Slovak Republic
4. **Hloušková Zuzana**
   - member of the organizing committees of the 5th International Conference Polymeric Materials in Automotive PMA 2013& 21st Slovak Rubber Conference 2013, April 2013, Hotel Bonbon, Bratislava and the 6th International Conference Polymeric Materials in Automotive PMA 2015& 22nd Slovak Rubber Conference 2015, May 2015, hotel Park Inn Danube, Bratislava, Slovak Republic;
   - member of the organizing committee of the 10th Anniversary Meeting EUROFILLERS 2013, August 2013, Hotel Park Inn Danube, Bratislava, Slovak Republic;
   - member of the organizing committee of the Workshop POLYFRIEND, September 2013, Polymer Institute of SAS, Bratislava, Slovak Republic
   - member of the organizing committee of the 14th International Seminar on Elastomers, ISE´14, August 2014, Hotel Park Inn Danube Bratislava, Slovak Republic
5. **Chmela Štefan**
   - member of the programme and organizing committee of the 6th European Weathering Symposium EWS, September 2013, Hotel Danube Inn, Bratislava, Slovak Republic
   - member of the programme committee of the Workshop POLYFRIEND, September 2013, Polymer Institute of SAS, Bratislava, Slovak Republic
6. **Chodák Ivan**
   - member of the programme committees of the 1st International Conference on Biobased Polymers and Composites BiPoCo 2012, May 2012 Siófok and the 2nd

International Conference on Bio-based Polymers and Composites BIPOCO 2014, August 2014, Visegrad, Hungary

- member of the programme committee of the conference Physics of Materials, October 2012, Košice, Slovak Republic;
- chairperson of the programme committees of the 5th International Conference Polymeric Materials in Automotive PMA 2013& 21st Slovak Rubber Conference 2013, April 2013, Hotel Bonbon, Bratislava and the 6th International Conference Polymeric Materials in Automotive PMA 2015& 22nd Slovak Rubber Conference 2015, May 2015, hotel Park Inn Danube, Bratislava, Slovak Republic;
- deputy chairperson of the programme and organizing committee of the 10th Anniversary Meeting EUROFILLERS 2013, August 2013, Hotel Park Inn Danube, Bratislava, Slovak Republic;
- chairperson of the programme committee of the 14th International Seminar on Elastomers, ISE´14, August 2014, Hotel Park Inn Danube Bratislava, Slovak Republic

7. **Ilčíková Markéta**
   - member of the programme and organizing committee of the 4th Bratislava Young Scientists Workshop, October 2012, Relax Hotel Avena – Liptovský Ján, Slovak Republic

8. **Janigová Ivica**
   - member of the organizing committees of the 5th International Conference Polymeric Materials in Automotive PMA 2013& 21st Slovak Rubber Conference 2013, April 2013, Hotel Bonbon, Bratislava and the 6th International Conference Polymeric Materials in Automotive PMA 2015& 22nd Slovak Rubber Conference 2015, May 2015, hotel Park Inn Danube, Bratislava, Slovak Republic

9. **Jochec Mošková Daniela**
   - member of the organizing committee of the 10th Anniversary Meeting EUROFILLERS 2013, August 2013, Hotel Park Inn Danube, Bratislava, Slovak Republic;
   - member of the programme and organizing committee of the 5th Bratislava Young Scientists Workshop, June 2014, Hotel Havrania, Zázrivá, Slovak Republic;
   - member of the organizing committee of the 14th International Seminar on Elastomers, ISE´14, August 2014, Hotel Park Inn Danube Bratislava, Slovak Republic;
   - member of the organizing committee of the 6th International Conference Polymeric Materials in Automotive PMA 2015& 22nd Slovak Rubber Conference 2015, May 2015, hotel Park Inn Danube, Bratislava, Slovak Republic

10. **Kollár Jozef**
    - member of the programme and organizing committee of the 4th Bratislava Young Scientists Workshop, October 2012, Relax Hotel Avena – Liptovský Ján, Slovak Republic;
    - member of the programme committee of the Workshop POLYFRIEND, September 2013, Polymer Institute of SAS, Bratislava, Slovak Republic
      member of the programme and organizing committee of the 5th Bratislava Young Scientists Workshop, June 2014, Hotel Havrania, Zázrivá, Slovak Republic

11. **Krupa Igor**
    - member of the Programme committee of the 10th Anniversary Meeting EUROFILLERS 2013, August 2013, Hotel Park Inn Danube, Bratislava, Slovak Republic;

12. **Lacík Igor**
    - member of the programme and organizing committee of the Workshop POLYFRIEND, September 2013, Polymer Institute of SAS, Bratislava, Slovak Republic

- chairperson and member of the programme and organizing committee of the XXII. International Conference on Bioencapsulation, September 2014, Hotel Holiday Inn Bratislava, Slovak Republic
- member of the international advisory board of the conference Functional Polymers at Bio-material Interfaces organized by Institute of Macromolecular Chemistry of AS CR Praha, June 28 – July 2, 2015,Czech Republic

13. **Mičušík Matej**
    - member of the programme and organizing committee of the 5th Bratislava Young Scientists Workshop, June 2014, Hotel Havrania, Zázrivá, Slovak Republic;
    - member of the programme committee of the 10th Anniversary Meeting EUROFILLERS 2013, August 2013, Hotel Park Inn Danube, Bratislava, Slovak Republic;
14. **Mosnáček Jaroslav**
    - chairperson of the programme and organizing committee of the Workshop POLYFRIEND, September 2013, Polymer Institute of SAS, Bratislava, Slovak Republic
    - chairperson of the programme and organizing committee of International Conference on Bio-Friendly Polymers and Polymer Additives: From Scientific Aspects to Processing and Applications BPPA14; May 19-21, 2014; Research Centre for Natural Sciences of the Hungarian Academy of Sciences in Budapest
15. **Omastová Mária**
    - member EPF of the advisory committee of the Conference EUPOC 2012, Porous Polymer-based Systems: From Design to Application, June 2012, Palazzo Feltrinelli, Gargnano, Lago di Garda (BS), Italy ;
    - chairperson of the programme and organizing committee of the 10th Anniversary Meeting EUROFILLERS 2013, August 2013, Hotel Park Inn Danube, Bratislava, Slovak Republic;
    - member EPF of the advisory committee of the Conference EUPOC 2013, Polymers and Ionic Liquids, September 2013, Palazzo Feltrinelli, Gargnano, Lago di Garda (BS), Italy;
    - member EPF of the advisory committee of the Conference EPF 2013, June 2013, Pisa, Italy;
    - chairperson of the programme committee of the 14th International Seminar on Elastomers, ISE´14, August 2014, Hotel Park Inn Danube Bratislava, Slovak Republic
    - member of EPF of Advisory committee of the Conference EUPOC 2014, May 2014, Palazzo Feltrinelli, Gargnano, Lago di Garda (BS), Italy;
    - chairperson of the programme and organizing committee of the EUPOC 2015, May 2015, Palazzo Feltrinelli, Gargnano, Lago di Garda (BS), Italy;
    - member of the programme committee of the Eurofillers Polymer Blend 2015, April 2015, Montpellier, France;
    - member of the programme committee of EPF Meeting, June 2015, Dresden, Germany
16. **Novák Igor**
    - member of the programme committee of the International Conference on Thermophysical and Mechanical Properties of Advanced Materials THERMAM 2014, June 2014, Cesme-Izmir, Turkey
17. **Papajová Eva**
    - member of the programme and organizing committee of the Workshop POLYFRIEND, September 2013, Polymer Institute of SAS, Bratislava, Slovak Republic

18. **Podhradská Silvia**
    - chairperson of the programme and organizing committee of the 4th Bratislava Young Scientists Workshop, October 2012, Relax Hotel Avena – Liptovský Ján, Slovak Republic;;
    - member of the organizing committee of the 10th Anniversary Meeting EUROFILLERS 2013, August 2013, Hotel Park Inn Danube, Bratislava, Slovak Republic;
    - member of the organizing committee of the Workshop POLYFRIEND, September 2013, Polymer Institute of SAS, Bratislava, Slovak Republic
    - member of the organizing committee of the XXII. International Conference on Bioencapsulation, September 2014, Hotel Holiday Inn Bratislava, Slovak Republic
    - member of programme and organizing committee of the 5th Bratislava Young Scientists Workshop, June 2014, Hotel Havrania, Zázrivá, Slovak Republic;
    - member of the organizing committee of the 14th International Seminar on Elastomers, ISE´14, August 2014, Hotel Park Inn Danube Bratislava, Slovak Republic

19. **Rychlá Lyda**
    - member of the programme and organizing committee of the 6th European Weathering Symposium EWS, September 2013, Hotel Danube Inn, Bratislava, Slovak Republic;

20. **Rychlý Jozef**
    - member of the programme and organizing committee of the 6th European Weathering Symposium EWS, September 2013, Hotel Danube Inn, Bratislava, Slovak Republic;

21. **Šišková Alena**
    - member of the programme and organizing committee of the 4th Bratislava Young Scientists Workshop, October 2012, Relax Hotel Avena – Liptovský Ján, Slovak Republic;
    - chairperson of the programme and organizing committee of the 5th Bratislava Young Scientists Workshop, June 2014, Hotel Havrania, Zázrivá, Slovak Republic;

22. **Šivová Mária**
    - member of the organizing committees of the 5th International Conference Polymeric Materials in Automotive PMA 2013& 21st Slovak Rubber Conference 2013, April 2013, Hotel Bonbon, Bratislava and the 6th International Conference Polymeric Materials in Automotive PMA 2015& 22nd Slovak Rubber Conference 2015, May 2015, hotel Park Inn Danube, Bratislava, Slovak Republic;
    - member of the organizing committee of the Workshop POLYFRIEND, September 2013, Polymer Institute of SAS, Bratislava, Slovak Republic

- **Position of individual researchers in a national context**

2.3.13. List of invited/keynote presentations at national conferences, as documented by programme or invitation letter

1. CHODÁK, Ivan - JOCHEC MOŠKOVÁ, Daniela. Clay nanocomposites with polymeric matrices - successes and disappointments. In PHYSICS OF MATERIALS 2012- Proceedings of the scientific conference, October 17-19, 2012, Košice. P. 16-20. - Košice: Technical University of Košice, 2012. ISBN 978-80-553-1175-3.
2. FLORIÁN, Štefan – NOVÁK, Igor - POPELKA, Anton – ŽIGO, Ondrej – SEDLIAČIK, J. Elektricky vodivé adhezíva. In Zborník príspevkov konferencie „Inovácie vo zváraní“, Spišské Podhradie, 6.–9. 11. 2012, p. 20–22. ISBN 978-80-971233-1-4.

3. NOVÁK, Igor - FLORIÁN, Štefan - POPELKA, Anton – ŽIGO, Ondrej – SEDLIAČIK, J. Inomérne nanokompozitné adhezíva. In Zborník príspevkov konferencie „Inovácie vo zváraní“, Spišské Podhradie, 6.–9. 11. 2012, p. 81-84. ISBN 978-80-971233-1-4.
4. OMASTOVÁ, Mária. Actuations of polymeric nanocomposites containing carbon nanotubes. In SAS - IVF - JST Workshop: Smolenice, Slovakia, 9 - 11 July 2013. - Bratislava: Slovak Academy of Sciences, Visegrad Fund, JST, 2013, p. 43 - 45.
5. FLORIÁN, Štepán - NOVÁK, Igor - SEDLIAČIK, J. - CHODÁK, Ivan - KLEINOVÁ, Angela - JURKOVIČ, P. - MATYAŠOVSKÝ, J. Štúdium polyamidu 12 očkovaného pôsobením bariérovej výbojovej plazmy. In Pokroky vo výrobe a použití lepidiel v drevopriemysle: XXI. sympózium: zborník referátov. - Zvolen: Technická univerzita vo Zvolene, 2013, p. 95 - 100. ISBN 978-80-228-2529-0.
6. CHODÁK, Ivan - NOVÁK, Igor - POPELKA, Anton. Plasma initiated modification of polymer surfaces for various applications. In SAPP : 19th Symposium on Application of Plasma Processes : Workshop on Ion Mobility Spectrometry : Vrátna, Slovakia, 26 - 31 January 2013: book of contributed papers. - Bratislava : Comenius University, 2013, p. 80 - 83.
7. NOVÁK, Igor - SEDLIAČIK, J. - VANKO, V. - CHODÁK, Ivan. Investigation of plasma-treated oak wood. In Pokroky vo výrobe a použití lepidiel v drevopriemysle: XXI. sympózium: zborník referátov. - Zvolen: Technická univerzita vo Zvolene, 2013, p. 90 - 94. ISBN 978-80-228-2529-0.
8. OMASTOVÁ, Mária. Polymeric nanocomposites with carbon nanofillers for advanced application. In BYPOS: 5th Bratislava Young Polymer Scientists Workshop: Zázrivá, Slovakia, June 16th - 20th, 2014: workshop book. - Bratislava: Young Scientists Council of Polymer Institute of the Slovak Academy of Sciences, 2014, p. 19-22. ISBN 978-80-970923-5-1
9. NOVÁK, Igor - POPELKA, Anton - ŠPITALSKÝ, Zdenko - OMASTOVÁ, Mária - LEHOCKÝ, M.- CHODÁK, Ivan - VALENTIN, Marian - PRACHÁR, Jozef. Anti-bacterial pre-treatment of polyolefins by cold plasma. In Zborník prednášok z medzinárodnej odbornej konferencieProgresívne technológiepre textil, jeho kvalitua bezpečnosť : Žilina,27. -28. 5. 2014. - Žilina : VÚTCH - CHEMITEX, spol. s r.o., 2014, [8 s.]. ISBN 978-80-971639-0-7.

2.3.14. List of researchers who served as members of organising and programme committees of national conferences

1. **Cifra Peter**
   - member of the programme committee of VII. Slovak-Czech Conference Polyméry 2012, November 2012, KC Smolenice, Slovak Republic
2. **Csomorová Katarína**
   - member of the organizing committee of VII. Slovak-Czech Conference Polyméry 2012, November 2012, KC Smolenice, Slovak Republic
3. **Danko Martin**
   - member of the organizing committee of 67. Congress of Chemical Societies, September 2015, Hotel Bellevue, Starý Smokovec, Slovak Republic
4. **Hloušková Zuzana**
   - member of the organizing committee of VII. Slovak-Czech Conference Polyméry 2012, November 2012, KC Smolenice, Slovak Republic
   - member of the programme and organizing committee of 65. Congress of Chemical Societies, September 2013, Hotel Hutník, Tatranské Matliare, Slovak Republic
   - member of the organizing committee of 67. Congress of Chemical Societies, September 2015, Hotel Bellevue, Starý Smokovec, Slovak Republic
5. **Chmela Štefan**
   - member of the programme committee of VII. Slovak-Czech Conference Polyméry 2012, November 2012, KC Smolenice, Slovak Republic

6. **Janigová Ivica**
    - chairperson of the programme and organizing committee of VII. Slovak-Czech Conference Polyméry 2012, November 2012, KC Smolenice, Slovak Republic
7. **Lacík Igor**
    - member of the programme and organizing committee of VII. Slovak-Czech Conference Polyméry 2012, November 2012, KC Smolenice, Slovak Republic
8. **Omastová Mária**
    - member of the programme committee of VII. Slovak-Czech Conference Polyméry 2012, November 2012, KC Smolenice, Slovak Republic
    - vice chairperson of the programme and organizing committee of 65. Congress of Chemical Societies, September 2013, Hotel Hutník, Tatranské Matliare, Slovak Republic
    - vice chairperson of the programme and organizing committee of 66. Congress of Chemical Societies, September 2014, Ostrava, Czech Republic
    - chairperson of the programme and organizing committee of 67. Congress of Chemical Societies, September 2015, Hotel Bellevue, Starý Smokovec, Slovak Republic
9. **Novák Igor**
    - member of the organizing committee of 21st Symposium Pokroky vo výrobe a použití lepidiel v drevopriemysle, June 2013, TU Zvolen, Slovak Republic
10. **Prochádzka Michal**
    - member of the organizing committee of 67. Congress of Chemical Societies, September 2015, Hotel Bellevue, Starý Smokovec, Slovak Republic
11. **Rychlý Jozef**
    - member of the programme committee of VII. Slovak-Czech Conference Polyméry 2012, November 2012, KC Smolenice, Slovak Republic
12. **Šivová Mária**
    - member of the organizing committee of VII. Slovak-Czech Conference Polyméry 2012, November 2012, KC Smolenice, Slovak Republic
13. **Špitalský Zdenko**
    - member of the programme committee of VII. Slovak-Czech Conference Polyméry 2012, November 2012, KC Smolenice, Slovak Republic

- **Supplementary information and/or comments documenting the international and national status of the Institute**

The mission of PI SAS is to achieve a strong both national and international position in the polymer science, research and development. This has led to tradition in organizing the scientific meetings and workshops, where many foreign scientists as well as representatives of the Slovak industry and academia participate. The creation of new contacts for national and international cooperation in the research areas covering the PI SAS expertise is a natural part of the scientific life of PI SAS scientists and this activity is strongly supported by the management board. This has been leading to new opportunities for cooperation and projects in various project calls globally.

Numerous invitations of individual researchers for short and longer stays in foreign laboratories, invited lectures at research institutions and universities, invitations to international projects, participation at conferences, etc. signify activities of PI SAS research staff to increase the visibility of our expertise and capabilities. Table below summarizes the mobility of the PI SAS research staff abroad (either training at the research institution or participation at the conferences) and training of the foreign scientists at PI SAS, during the years 2012 through 2015. PI SAS welcomes the flow of scientists, PhD students and post-docs in both directions to and from the

institute. Our aim is to increase the portion of flow to the institute that would correspond to the significance and visibility of PI SAS abroad. The National Scholarship Programme of the Slovak Republic (SAIA) was used as one feasible option to gain totally 5 foreign researchers for postdoc and 1 professorship stays at our institute. PI SAS also organizes the invited lectures of outstanding researchers from Europe at PI SAS. During the assessment period totally 16 professors and 20 researches from various foreign universities and research institutes gave a lecture at PI SAS. To point just ten of them: prof. Terentjev from Cambridge (UK), prof. Hadjichristidis from KAUST (Saudi Arabia), prof. Tsiang from NCCU (Taiwan), prof. Liska from TU Vienna (Austria), prof. Meira from CONICET (Argentina), prof. Moscatelli from TU Milano (Italy), prof. Hutchinson from Queen's University (Canada), prof. Kajiwara from NUE (Japan), prof. Matyjaszewski from CMU (USA), prof. Shipp from CUP (USA) etc. The visits of these outstanding researchers speak about strong contacts with important institutions abroad as well as contribute to the visibility of our institute.

Scientists from PI SAS			**Scientists from PI SAS at conferences**		**Scientist visiting PI SAS**	
Year	**number**	**days**	**number**	**days**	**number**	**days**
2012	38	1908	33	328	30	286
2013	44	2284	32	316	46	878
2014	42	2451	39	391	40	915
2015	38	2088	28	285	44	883

2.4. Tables of project structure, research grants and other funding resources

- **International projects and funding**

2.4.1. Major projects within the European Research Area and other important project – Framework Programmes of the EU, ERA-NET, European Science Foundation, NATO, COST, INTAS, etc. (here and in items below please specify: type of project, title, grant number, duration, total funding and funding for the institute, responsible person in the institute and his/her status in the project, e.g. coordinator "C", work package leader "W", investigator "I"),

	Project title	Type / Project number	Duration in months	Funding for the Institute (EUR)	Role of the Institute / Responsible person
2012	Low temperature heat exchangers based on thermally conducting polymers nanocomposites Acronym: THERMONANO	Collaborative Project-Large Project 7th FP EU / No: 227407	01/2009-06/2012	48 830 € + 600 € (APVV)	I / Ivan Chodák
	Nano-optical mechanical systems Acronym: NOMS	Collaborative Project-Small Project 7th FP EU / No: Stage 1 CO-FP 228916-1	09/2009-08/2012	70 364 € + 4 000 € (APVV)	I / Igor Krupa
	Strategy for the preservation of plastics artefacts in museums collections Acronym: POPART	Collaborative Project-Project 7th FP EU / 031867	10/2008-03/2012	16 567 € + 4 000 (APVV)	W / Jozef Rychlý
	Orientation of carbon nanotubes in polymer composites Acronym: ORITUPUCO	Project 7th FP EU, Support Action / registration number: 231085	03/2009-02/2012	21 510 € + 1 625 € (APVV)	C / Zdenko Špitálský
	Secondary relaxations in 1,4-poly(isoprene)s as a function of chain length in relation to the glass-liquid transition phenomenon by a combined Broadband Dielectric Spectroscopy (BDS), Positron Annihilation Lifetime Spectroscopy (PALS) and Electron Spin Resonance (ESR) investigations	Project 7th FP EU; European Soft Matter Infrastructure (ESMI) / registration number: MVTS No. E111100143	12/2011-12/2012	sharing infrastructure	I / Josef Bartoš
	Innovative value chain development for sustainable plastics in Central Europe	Project ERDF / 3C368P1	04/2011-03/2014	121 166 €	I / Ivan Chodák
	POLYFRIEND - Advanced bio-friendly polymers	Project ERDF / HUSK/1101/1.2.1/0209	10/2012-09/2014	498 900 €	C / Jaroslav Mosnáček
	Applications of polymer nanocomposites with low content of graphene in electronic devices	Project ERA-NET / ID 794	01/2012 - 12/2014	144 000 €	I / Zdenko Špitálský
	Biological adhesives: from biology to biomimetics	Project COST / TD0906	04/2011-03/2014	12 000 €	I / Peter Kasák

	Next generation cost effective phase change materials for increased energy efficiency in renewable energy systems in buildings - NeCoE-PCM	Project COST / TU0802	11/2009-10/2012	12 000 €	I / Igor Krupa and Marta Malíková
	European scientific network for artificial muscles' - ESNAM	Project COST / MP1003	12/2010-11/2014	16 000 €	I / Mária Omastová
	Sustainable flame retardancy for textiles and related materials based on nanoparticles substituting conventional chemicals – FLARETEX	Project COST / MP1105	05/2012-05/2016	12 000 €	I / Mária Omastová
	Electrospun nano-fibres for bio-inspired composite materials and innovative industrial applications	Project COST / MP1206	05/2012-05/2017	4 100 €	I / Mária Omastová
2013	Resolving the segmental relaxation dynamics in oligomeric 1,4 – poly (isoprene)s	Project 7th FP EU / ESMI E150100651, MVTS No. E13010033	01/2013-12/2013 and 01/2015-12/2015	11 133 €	I / Josef Bartoš
	Electrospun nano-fibres for bio-inspired composite materials and innovative industrial applications	Project COST / MP1206	05/2012-05/2017	16 000 €	I / Mária Omastová
	Innovative application of regenerated wood cellulose fibers	Project COST / MP1205	05/2013-05/2017	15 000	I / Alena Šišková
	New materials and devices based on conducting polymers and their composites – stage I	Project COST / Danube project; BMBF	01/2013-12/2014	1 666 €	I / Mária Omastová
2014	M2Neural: Multifunctional Materials for advanced Neural interfaces	Project 7th FP EU M-ERA.Net Transnational Call 2013	11/2014-10/2017	33 293 €	I / Igor Lacík
	Photovoltaic and sensor properties of plasma and chemical functionalized graphene and carbon nanotubes	Project JRP / SAS-TÜBİTAK JRP 2014/2	12/2014-11/2017	11 683 €	C / Mária Omastová
	Multicomponent microcapsules for allogeneic islet transplantation in a comprehensive, preclinical non-human primate model	Project JDRF/ JDRF 2-SRA-2014-288-Q-R	11/2014-10/2017	162 205 €	I / Igor Lacík
2015	Stable next-generation photovoltaics: Unravelling degradation mechanisms of organic solar cells by complementary characterization techniques Acronym: StableNextSol	Project COST / MP 1307	02/2015-03/2018	3 666 €	I / Mária Omastová
	New materials and devices based on conducting polymers and their composites – Stage II	Project COST / Polycon01DS15015	09/2015-01/2016	465 €	I / Mária Omastová
	Synthesis of well-defined novel copolymers by use of living polymerization methods and advanced chromatography techniques	Project JRP / SAS-MOST Taiwan JRP 2014	01/2015-12/2017	8 334 €	C / Jaroslav Mosnáček

	CASSETTE: Conjugated Antisense system for Selective and Specific BCR-ABL supprEssion: An innovaTive straTegy for CML treatment	Project SASPRO co-funded by Maria Curie Actions / SASPRO 00577/01/02	04/2015-03/2018	68 095 €	C / Filip Rázga
	ANTIGRPONANO: ANTIbacterial GRaphene/Polymer NANO composite	Project SASPRO co-funded by Maria Curie Actions / SASPRO 1237/02/02	12/2015-11/2018	73 510 €	C / Zoran Markovic

2.4.2. Other international projects, incl. total funding and funding for the institute

1. Project BASF **Determination of rate coefficients of water-soluble monomers with special emphasis on charged/ionizable monomers**; registration number: BASF AG; duration of the project: 06.2004 – 05.2014; funding: 30 000 EUR/year; **Lacík Igor** – coordinator
2. Project BASF **Kinetic coefficients and models for existing and future polymerization processes and systems at BASF**; registration number: BASF AG; duration of the project: 09.2015 – 08.2018; funding: 105 000 EUR; **Lacík Igor** – coordinator
3. Project **The Chicago Diabetes Project**: **Global collaboration for a functional cure** (sponsored by Washington Health Square Foundation); registration number: ---; duration of the project: 05.2007 – open; funding: 51 269 EUR; **Lacík Igor** - principal investigator from the Polymer Institute of SAS; coordinator: University of Illinois, Chicago, USA
4. Project EFSD New Horizons Collaborative Research Initiative **Microcapsules for immunoprotection of transplanted islets: prediction of biocompatibility by whole blood assay**; registration number: ---; duration of the project: 05.2011 – 04.2012; funding: 97 000 EUR; Lacík Igor – coordinator
5. Project of Slovak-Bulgarian International Scientific Technical Cooperation **New functional copolymers based on cyclic iminoethers designed for biomedical applications;** registration number: APVV-SK-BG-0038-10; duration of the project: 01.2012 – 12.2013; funding: 4 696; **Kronek Juraj** - coordinator
6. Project of Slovak-Czech Bilateral Cooperation **LCP BLENDS: Study of liquid-crystalline polymers and their composites;** registration number: APVV-SK-CZ-2013-0234; duration of the project: 01.2015–12.2015; funding: 3 880; **Kronek Juraj** – coordinator
7. Project of Slovak-Portugal Bilateral Cooperation **New electric conductive polymer nanocoposites based on graphene;** registration number: APVV-SK-PT-0021-10; duration of the project: 06.2011–12.2012; funding: 5 400; **Špitalský Zdeno** – coordinator
8. Project of Slovak-Czech Bilateral Cooperation **Effect of conductivity on dielectric and magnetic properties of hybrid polymer composites;** registration number: APVV SK-CZ-0174-11; duration of the project: 01.2012–12.2013; funding: 3 936 EUR; **Špitalský Zdenko** - coordinator
9. Project NPRP **New phase change materials with improved heat transfer properties;** registration number: NPRP No.: 4–465–2-173; duration of the project: 11.2011–10.2014; funding: 74 400 USD (57 173,54 EUR); **Krupa Igor/Špitalský Zdenko** - principal investigators from the Polymer Institute of SAS; coordinator: Qatar University, Doha, Qatar
10. Project of Slovak-Greek Bilateral Cooperation **High performance sensors on the base of conducting polymers and composites;** registration number: APVV SK-GR- 0029-11; duration of the project: 01.2013-12.2014; funding: 5 300 EUR; **Omastová Mária** - coordinator
11. Project of Slovak-Portugal Bilateral Cooperation **Polymer-ceramic nano composites for embedded capacitors-NanoEmbedded;** registration number: APVV SK-PT-0021-12; duration of the project: 01.2013-12.2014; funding: 5 700 EUR; **Špitalský Zdenko** - coordinator

12. Project of Slovak-Czech Bilateral Cooperation **(Bio)polymers and bioinspired materials for biomedicine;** registration number: APVV-SK-CZ-2013-0206; duration of the project: 01.2014-12.2015; funding: 4 000 EUR ; **Lacík Igor** – coordinator
13. Project of Slovak-French Bilateral Cooperation **Dye-labelled carbon nanotubes for optothermal actuation of nanocomposites;** registration number: APVV- SK-FR- 2013-0033; duration of the project: 01.2013-12.2015; funding: 5 200 EUR; **Omastová Mária** - coordinator
14. Project of Slovak-Serbian Bilateral Cooperation **Transparent, electrically conductive polymeric nanocomposites on the base of nanostructured graphite;** registration number: SK-SRB-2013-0044; duration of the project: 01.2015-12.2016; funding: 4 700 EUR; **Špitalský Zdenko** - coordinator

2.4.3. Other important, international projects and collaborations without direct funding (max. 10 projects)

1. Project 7th FP EU - European Soft Matter Infrastructure (ESMI) **Secondary relaxations in 1,4-poly(isoprene)s as a function of chain length in relation to the glass-liquid transition phenomenon by a combined Broadband Dielectric Spectroscopy (BDS), Positron Annihilation Lifetime Spectroscopy (PALS) and Electron Spin Resonance (ESR) investigations**; duration of the project: 12.2011-12.2012, sharing infrastructure; **Bartoš Josef** – principal investigator from the Polymer Institute of SAS; coordinator: Institut fur Festkoerperforschung (IFF), Juelich, Germany
2. Project 7th FP EU **-** ESMI E150100651 **Resolving the segmental relaxation dynamics in oligomeric 1,4 – poly (isoprene)s;** type of project: European Soft Matter Infrastructure (ESMI); registration number: duration of the project: 01.2013-12.2013; 01.2015-12.2015, sharing infrastructure; **Bartoš Josef** – principal investigator from the Polymer Institute of SAS; coordinator: CFM - UPV/EHU, San Sebastian, Spain
3. Project of Slovak-Bulgarian Bilateral Cooperation **New stimuli-responsive copolymers based on cyclic iminoethers**; duration of the project: 01.2012-12.2014; mobility; **Kronek Juraj** - coordinator
4. Project of Slovak-Czech Bilateral Cooperation **Preparation and electrical properties of conducting polymer composites and nanocomposites;** duration of the project: 01.2012-12.2016; mobility; **Omastová Mária** - coordinator
5. Project of Slovak-French Bilateral Cooperation **Synthesis, molecular characterization and purification of block polymers.** duration of the project: 01.2013-12.2014; mobility; **Berek Dušan** - coordinator
6. Project of Slovak-Poland Bilateral Cooperation **Ring-opening (co)-polymerization of butyrolactone based monomers;** duration of the project: 01.2013-12.2015; mobility; **Danko Martin** - coordinator
7. Project of Slovak-German Bilateral Cooperation **Sensors for liquids and vapours based on electric conductive polymer/carbon nanotubes composites;** duration of the project: 01.2013-12.2014; mobility; **Omastová Mária** - coordinator
8. Project of Slovak-Poland Bilateral Cooperation **Characterization of stimuli sensitive polymers with different topology by aqueous gel permeation chromatography;** duration of the project: 01.2013-12.2015; mobility; **Stach Marek/Kronek Juraj** - coordinators
9. Project of Slovak-Argentinian Bilateral Cooperation **Characterization of chromatographically-complex polymers by advanced liquid chromatography methods: MD-SEC and LC LCD;** duration of the project: 01.2013-12.2015; mobility; **Šišková Alena** - coordinator
10. **Project** Slovak-German Bilateral Cooperation **DAAD-SAS 2014 External probe characterization of the confined organics;** duration of the project: 01.2014-12.2015; mobility; **Bartoš Josef** - coordinator

- **National projects and their funding**

2.4.4. Projects supported by the Slovak Research and Development Agency (APVV)

	Project title	Typ / Project number	Duration in months	Funding for the Institute (EUR)	Role of the Institute / Responsible person
2012	OC&PNC Organoclay and their polymer composites	Project APVV / APVV-0362-10	05/2011-10/2014	99 999 €	I / Ivan Chodák
	DIASOLVE: Advanced polymer technologies in biomedicine: Polymer microcapsules for immunoprotection of transplanted pancreatic islets in diabetes treatment	Project APVV / APVV-0486-10	05/2011-10/2014	149 400 €	C / Igor Lacík
	MONARCHEM: Immobilization techniques for preparation of biocatalysts for industrial production of of natural flavours	Project APVV / APVV-0302-10	05/2011-10/2014	28 000 €	I / Igor Lacík
	LIVICOP: Living/controlled polymerizations: Optimization of polymerization process toward well defined polymers with targeted architecture and properties	Project APVV / APVV-0109-10	05/2011-10/2014	223 720 €	C / Jaroslav Mosnáček
	NANOBIOROZ: Preparation of nanostructured interphases, their integration with bioelements and subsequent use	Project APVV / APVV-0282-11	07/2011-12/2015	15 574 €	I / Jaroslav Mosnáček
	Biodecorated composite magnetic nanoparticles: Preparation, collective properties and applications	Project APVV / APVV-0125-11	07/2012-12/2015	89 950 €	C / Ignác Capek
	Nanostructure in macromolecular systems induced by confinement	Project APVV / APVV-0451-11	07/2012-12/2015	119 121 €	C / Peter Cifra
	Photoactive hybrid nanomaterialswith luminescent and antimicrobial properties	Project APVV / APVV-0291-11	07/2012-12/2015	11 324 €	I / Martin Danko
	NanoTechPDT: Towards increased sensitivity of cancer detection and selectivity of cancer treatment: biophotonic nanotechnology applications	Project APVV / APVV-0242-11	07/2012-12/2015	23 835 €	I / Juraj Kronek
	CA(IX)NCER: Carbonic anhydrase IX as a functional component of cancer progression: the role in epithelial-mesenchymal transition and intercellular signaling	Project APVV / APVV-0658-11	07/2012-12/2015	71 741 €	I / Igor Lacík

	Nanostructured materials for sensorics	Project APVV / APVV-0593-11	07/2012-12/2015	61 687 €	I / Matej Mičušík
2013	RUBBLEND: Rubber compounds with new types of fillers for special applications	Project APVV / APVV-0694-12	10/2013-09/2016	50 000 €	I / Ivan Chodák
	Silicon carbide thin film technologies: Research and development of silicon carbide thin film technologies for application in solar cells and thin film devices	Project APVV / APVV-0443-12	10/2013-12/2016	15 665 €	I / Angela Kleinová
2015	METALLOCENE: Unreactive melt adhesives based on metallocene polymers for industrial applications	Project APVV / APVV-14-0566	07/2015-12/2019	96 995 €	C / Ivan Chodák
	MEDERIT: Materials and processes for functional encapsulation of pancreatic islets in diabetes treatment	Project APVV / APVV-14-0858	07/2015-06/2019	175 576 €	C / Igor Lacík
	NANOSEN: Nanoparticles-based sensors of gaseous biomarkers of diseases	Project APVV / APVV-14-0891	07/2015-06/2019	41 175 €	I / Jaroslav Mosnáček
	BIOGLYKO: Biochips and biosenzors for glycorecognition, their development, preparation and application in anser research	Project APVV / APVV-143-0753	07/2015-06/2019	24 000 €	I / Jaroslav Mosnáček
	NANOSIMKA: Effects of nanoencapsulated simvastatin on cardiovascular system in experimental metabolic syndrome	Project APVV / APVV-14-0932	07/2015-06/2019	39 990 €	I / Jaroslav Mosnáček
	GONanoplatform: Graphene-based nanoplatform for detection of cancer	Project APVV / APVV-14-0120	07/2015-06/2019	86 462 €	C / Mária Omastová
	PLAZTEXNANO: Research of the impact of low temperature PLASma on increase the surface treatment permanence of TEXtile materials using NANOsols	Project APVV / APVV-14-0518	07/2015-06/2019	125 000 €	C / Zdenko Špitálský

2.4.5. Projects supported by the Scientific Grant Agency of the Slovak Academy of Sciences and the Ministry of Education (VEGA) for each year, and their funding

VEGA	2012	2013	2014	2015
Number	15	15	19	18
Funding in the year (EUR)	119803	111531	116354	112780

- **Summary of funding from external resources**

2.4.6. List of projects supported by EU Structural Funds

Role of the Institute in the project, e.g. coordinator "C", work package leader "W", investigator "I".

Year	Project title	Project number	Duration in months	Funding for the Institute (EUR)	Role of the Institute
2012	Innovative value chain development for sustainable plastics in Central Europe	3C368P1 ERDF	04/2011-03/2014	121 166,00 €	Ivestigator
	POLYFRIEND - Advanced bio-friendly polymers	HUSK/1101/1.2.1/0209	10/2012-09/2014	898 525,00 €	Coordinator
	Central of applied investigation of nanoparticles	NFP26240220017	09/2009-12/2012	126 554,00 €	Investigator
	Adjusting the product portfolio of VIPO	26220220091 OP VaV-2009/2.2/03-SORO	02/2010-02.2013/06.2014	66 369,00 €	Investigator
	Centre for materials, layers and systems for applications and chemical processes under extreme conditions – Stage II	26240120021	04/2010–03/2012	517 900,00 €	Investigator
	Research on application potential of renewable and recycled materials and information technologies in rubber industry	828524, OPVaV-2011/2.2/07-SORO	07/2012–05/2015	32 054,25 €	Investigator
2013	Centre for applied research of new materials and technology transfer	262 402 200 88	09/2013-08/2015	39 069,56 €	Investigator

2.4.7. Summary of external resources of the EU Structural Funds (ERDF/ESF)

External resources	2012	2013	2014	2015	total	average
External resources (milions of EUR)	1,760	0,040	0,000	0,000	**1,800**	**0,450**
External resources transfered to coooperating research institute (milions of EUR)	0,400	0,000	0,000	0,000	**0,400**	**0,100**

- **Supplementary information and/or comments on research projects and funding sources**

The PI SAS funding is based on the multi-source principle. The external funding is the key condition to perform the scientific activities and fulfill the mission and, in principle, the existence of PI SAS. This multi-source principle is based on the national and international projects, and the contracts with industry. Overall, the external funding at the level of 50 % of the institute budget warrants stable conditions, which has been achieved over the last years.

PI SAS has been successful at the national level in the competition for the national projects via the Slovak Research and Development Agency (the most important national funding body for the research project) and via the Scientific Grant Agency of the Ministry of Education, science, research and sport of the Slovak Republic and the Slovak Academy of Sciences.

The contracts with national and international partners also represent an important source of financial resource as well as contacts with the industrial partners and direct utilization of the knowledge produced at the institute in the application area. Here we feel that the number of existing cooperation should increase. We actively search for the opportunities for this type of collaboration, we discuss with potential partners in Slovakia and participate on the fairs and meetings devoted to making more contacts and visibility of the expertise of institute.

With respect to the EU projects, four projects of the EU FP7 were completed in 2012. Even though the PI SAS scientist participated, in the role of partners, in preparation and submission of in total 24 projects within the FP7, H2020 and ERC grants, none of them was supported. This reveals that it becomes extremely difficult to succeed in obtaining this type of grant in the area of polymer science and related areas where polymer science is utilized. For example, in year 2015 three H2020 grants with participation of PI SAS researchers were evaluated at the level of 14 points out of 15, which was still insufficient for granting (e.g. in the FET call, 6 proposals were granted out of around 800 projects, which is a ridiculous situation giving a critically low probability to succeed). On the other hand, PI SAS was successful in obtaining the projects from Structural funds EU, ERDF, ERA.net, COST, Marie-Curie mobility, which are seen as an excellent opportunity provided by the EU for contribution to the polymer science and related scientific fields in the European research area, in transfer of knowledge, in initiating the collaboration, and training the young generation.

2.5. PhD studies and educational activities

2.5.1. List of accredited programmes of doctoral studies, period of validity

Study Program (SP)	Study Field (SF)	No. SF	Univesity / Faculty
Physical chemistry	physical chemistry	4.1.18	Slovak University of Technology in Bratislava, Faculty of chemical and food technology – 2008-2015 (till acreditation of University), Comenius University in Bratislava, Faculty of Natural Sciences – Without time limit (if it is carried out according to the law)
Macromolecular chemistry	macromolecular chemistry	4.1.19	Slovak University of Technology in Bratislava, Faculty of chemical and food technology - Without time limit (if it is carried out according to the law)
Technology of polymer materials	technology of macromolecular materials	5.2.21	Slovak University of Technology in Bratislava, Faculty of chemical and food technology - Without time limit (if it is carried out according to the law)

2.5.2. Summary table on doctoral studies (number of internal/external PhD students; number of foreign PhD students, number of students who successfully completed their theses, number of PhD students who quit the programme*)*

PhD study	31.12.2012			31.12.2013			31.12.2014			31.12.2015		
Number of potential PhD supervisors	23			24			23			19		
PhD students	number	defended thesis	students quitted	number	defended thesis	students quitted	number	defended thesis	students quitted	number	defended thesis	students quitted
Internal	14,0	4,0	0,0	14,0	5,0	1,0	15,0	1,0	1,0	12,0	3,0	3,0
External	1,0	0,0	0,0	1,0	0,0	0,0	2,0	1,0	0,0	1,0	1,0	0,0
Other supervised by the research employees of the institute	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

From totally 14 PhD students who defended their thesis during the assessed period, 8 were employed at the Polymer Institute as postdocs, 2 are currently working as research scientists at Qatar University, 3 are working in companies in Slovakia (Boge Elastmetall Slovakia a.s., Trnava; Elastorsa Slovakia s.r.o., Martin; Chromservis, Bratislava) and current position of 1 is unknown.

2.5.3. Summary table on educational activities

Teaching	2012	2013	2014	2015
Lectures (hours/year)[2]	83	77	94	90
Practicum courses (hours/year)[2]	11	84	5	412
Supervised bachelor theses (in total)	0	0	1	2
Supervised diploma theses (in total)	1	3	1	4
Supervised PhD theses (in total)	18	20	19	16
Members in PhD committees (in total)	13	12	12	12
Members in DrSc. committees (in total)	6	6	7	2
Members in university/faculty councils (in total)	3	2	2	3
Members in habilitation/inauguration committees (in total)	5	1	3	3

2.5.4. List of published university textbooks

2.5.5. Number of published academic course books

2.5.6. List of joint research laboratories/facilities with universities

- **Supplementary information and/or comments on doctoral studies and educational activities**

The PI SAS scientists are acting as lecturers at the Faculty of Science, Comenius University in Bratislava, at the Faculty of Chemical and Food Technology STU in Bratislava, at the Faculty of Materials Science and Technology STU in Trnava, and at the Faculty of Industrial Technologies of Trenčín University in Púchov. During the last years several diploma thesis of students from the above universities were done at PI SAS. Overall it can be stated that PI SAS is having a high quality research stuff capable of lecturing different subjects at the relevant universities, nevertheless, the interest from these universities remains to be low likely due to a low number of students and relatively high number of own lecturers.

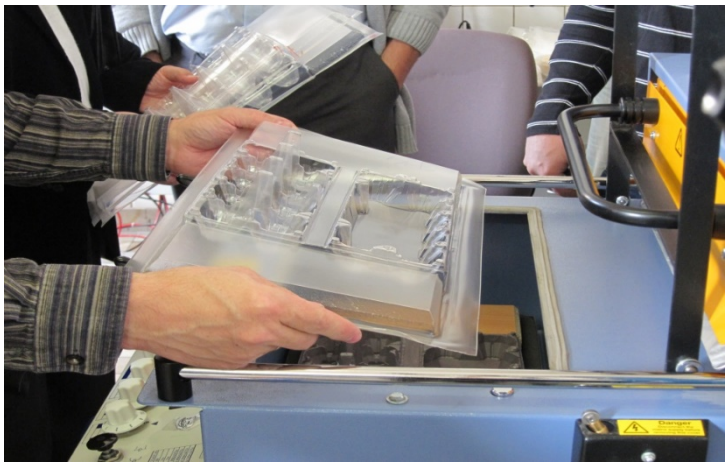
PI SAS is accredited for conduction of doctoral studies in three fields: Macromolecular chemistry, Technology of macromolecular materials, and Physical chemistry, where PI SAS acts as the external educational institution. Apart from the lectures and examination associated with the PhD studies at universities, the PhD students are evaluated annually by the Scientific Board of PI SAS, which is based on presentation (in English), discussion of results and overall activity and outcomes. PI SAS pays a strong attention to obtaining a high quality of doctoral students. However, quite small base of universities with subject of polymer science in Slovakia and relatively low possibility of transfer of knowledge of the scientists from the PI SAS to students results in a low and non-systematic impact on selection of candidates for the doctoral studies in competition with the universities. This is seen as a disadvantage for systematically keeping the high level of doctoral studies at PI SAS. Therefore, it is more and more desirable to focus on gaining the PhD students from abroad.

2.6. Social impact

2.6.1. List of the most important results of applied research projects. Max. 10 items

1. Blends of biodegradable plastics with high toughness.

New material was developed, based on a blend of two biodegradable plastics, namely polylactic acid (PLA) and polyhydroxybutyrate (PHB). Unlike other similar materials, which are brittle, the developed blend exhibits high toughness, e.g. elongation at break over 400 % compared to the blends of PLA and PHB reported and patented by other authors, being below 20 %, typically 2 – 5 %, in spite of almost the same composition of the blends. Moreover the new material is much more resistant to physical ageing.These unique properties, consisting in a formation of tough material by mixing of two extremely brittle polymers, have been achieved by the appropriate ratio of the polymers, adition of plasticizer, and optimized processing conditions. It is worth to mention that all components of the mixture are biodegradable materials from renewable resources. The material is processable by all standard technologies used for plastics; the pilot-scale tests were made for extrusion, injection-molding, and blow-moding, while vacuum thermoforming was tested only in laboratory conditions. After applying for Slovak patent in April 2011 and passing successfully through PCT phase at the end of 2013, patent applications were submitted to a number of countries, Japanese patent being the first already awarded at the end of 2015. An agreement covering the licence for Europe was signed with a Slovak company and the production of material is expected to start in 2017.



Vacuum forming of the egg-box made of biodegradable plastics.

2. Antibacterial polyolefin foils modified by low-temperature plasma.

The effect of antibacterial modification of polyolefins, low density polyethylene and isotactic polypropylene in the multi-step process of their surface modification using a low-temperature discharge plasma was investigated. The aim of these studies has been to develop antibacterial polyolefins for the automotive and packaging industries as well as in human medicine. In the first step, the polyolefin surface was pre-treated by the effect of barrier, micro-wave or radio-frequency discharge plasma in the air. In the second step, the functionalization of the surphase was performed by suitable precursors or different monomers (acrylic acid, allyl alcohol, allyl amine, 2-(hydroxyethyl methacrylate)). In the third step, selected antibacterial agents were immobilized such as low-molecular weight compounds based on halogens as triclosan, bronopol, chlorhexidine, and also polysaccharides (chitosan, chitosan/pectin, alginic acid). An antibacterial film of low-density polyethylene has been awarded on the 15th international medical exhibition Slovmedica 2013, Incheba Expo, Bratislava by the "Gold Incheba Medal".

3. Kinetic coefficients and models for existing and future polymerization processes and systems at BASF.

The long-term cooperation with BASF SE Ludwigshafen, Germany, which started in 1999 and lasts with a few interruptions till today (the last contract signed from 2016 till 2018), is focused on (i) determining the individual rate coefficients for radical polymerization of water-soluble monomers polymerized in aqueous solutions, (ii) postulation of mechanistic models, and (iii) verification of mechanistic model and individual rate coefficients by modeling the polymerization rates and molar mass distributions. For particular homo or copolymerization systems, predominantly the IUPAC-recommended pulsed-laser polymerization techniques in conjunction with the size-exclusion chromatography and in line ^{1}H NMR have been employed to obtain the information on individual rate coefficients, molar mass distributions and time-conversion profiles, respectively. A number of questions have been answered on mechanism and kinetics for radical polymerization of various water-soluble acrylates, methacrylates and *N*-vinyl amides.

4. Multicomponent microcapsules for allogeneic islet transplantation in a comprehensive, preclinical non-human primate model.

Polyelectrolyte complex-based microcapsules made of sodium alginate, cellulose sulfate and poly(methylene-co-guanidine) are biotolerated after transplantation to peritoneal cavity of the pre-clinical primate (baboon) model both empty and with encapsulated allo-transplanted (baboon) islets of Langerhans. These data created the basis for application for the project at the Juvenile Diabetes Research Foundation, which is the world-leading organization supporting the research to cure diabetes type 1. The project in collaboration with University of Illinois at Chicago (PI) and NTNU University Trondheim has been approved and started in 2014. These follow-up studies require optimization of both microcapsule chemistry and process of preparation.

5. Polymers for anti-cancer therapy.

Within the interdisciplinary SASPRO project CASSETTE aimed at the design, synthesis and validation of a novel antisense system for the treatment of patients with chronic myelogenous leukemia, vital collaborations bridging the academy and clinics have been established. This project initiated a close cooperation with both national and foreign research and clinical institutions including the (i) National Centre for Biomolecular Research in Brno (CEITEC), which is expected to solve partial tasks employing methods of computational chemistry, (ii) University Hospital Antolska in Bratislava, responsible for the banking of patient samples for the purposes of this project, (iii) Biomedicine Centre SAS in Bratislava providing the infrastructure for functional validation of the proposed antisense system and (iv) Center for Molecular Biology and Gene Therapy (CMBGT) in Brno collecting the samples for comprehensive screening of prognostic markers. This unique consortium allows for the investigation and deeper understanding of the molecular basis of disease pathophysiology.

6. Quantitative evaluation of aerobic biodegradation of aromatic aliphatic copolyester Ecoflex induced by bacteria from different surroundings by nonisothermal chemiluminescence.

The surface of Ecoflex films (biodegradable copolyester of butyric, adipic and terephthalate acids) films after inoculation by the various bacteria (see table below) gives significantly stronger chemiluminescence–temperature signal than that in control experiments. This fact was used for the quantitative estimation of effect of bacteria on the degradation of the copolyester. This represents a significant contribution to this field because until now only qualitative determination could be done based on a visual assesment from the growth of colonies of bacteria.

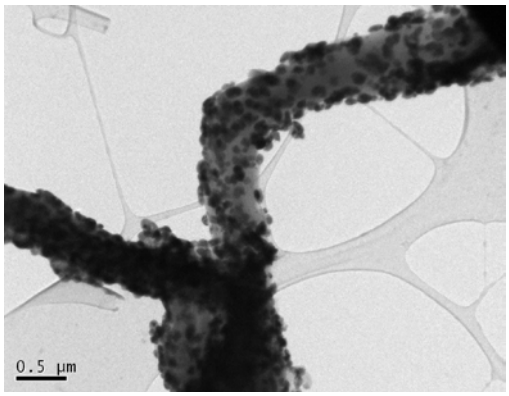
Bacteria	Degradation activity			
	Three days	Two weeks	Four weeks	Eight weeks
Brevibacterium sp.	-	-	+	+++
Bacillus thuringiensis	++	++++	++++	++++
Rahnella aquatilis	+	++	++	++++
Geobacillus kaustophilus	+++	++++	++++	++++
Aeromonas media	+	+++	+++	++++

7. Dental adhesives.

In cooperation with Ivoclar Vivadent AG, Shaan, Liechtenstein, PI SAS works on basic characterization of homo as well as copolymerization of new monomers. This includes several methacrylates and acrylamides containing free phosphonic acid or its diethyl esters. Effects of temperature, monomer concentration as well as initiator concentration were studied. Polymerization proceeded readily through a thermal free radical initiator. The intensity exponents for the monomer and initiator were around 1 and 0.5, respectively, in accordance with the results typically observed for an ideal free radical polymerization with bimolecular termination. The kinetics of copolymerization with methyl methacrylate (MMA) was monitored by online ^{1}H NMR spectroscopy. For each pair of co-monomers the kinetic data (reactivity ratios) were evaluated using the Jacks method, the Fineman-Ross method and the nonlinear least squares method. All three methods gave similar results for particular monomer/MMA couples. All monomers readily copolymerized with MMA through a free radical initiator. Compared to a MMA reaction, the acrylamides reacted 4 to 13 times faster, while reactivity of methacrylates was the same as reactivity of MMA. The aim of this research was to identify active adhesive monomers with low shrinkage that provide better adhesion to the teeth dentin and enamel for clinically applied dental filling composites.

8. Composite materials based on microporous carbon fibers prepared by controlled carbonization of cellulosics.

The aim of research was to prepare original composite materials in which nano- and microparticles of active substances would be deposited on a suitable fibrous carrier. After a series of introductory experiments, microporous carbon fibers prepared by carbonization of cellulose precursors were chosen. Cellulose is a relatively cheap and well accessible natural material and its controlled carbonization enabled to prepare fibers with surface area from about 2 to almost 2,000 m^2/g. Their average pore size, as measured by both the BET and the positron annihilation life time spectroscopy, was found to be in all cases about 0.6 nm. However, according to the SEM measurements, the pore entrances of CF are about ten times larger. This is an ideal situation, which enables to firmly deposit nano- and microparticles of active substance exclusively on the surface of carbon fibers so that they remain well accessible for reactants, sorbates, etc. At the same time, the overall macrostructure of composites permits filtration and sedimentation procedures, which are not feasible for segregated nano- and microparticles. The first composite of this kind with nanoparticles of $Fe(OH)_3$ (CF-Fe, see Figure) was tested for removal of harmful metals (As, Sb, Se, Cr, Pb and natural radionuclides) from (drinking) water. It was shown that the material exhibited very high adsorption efficiency, up to three times higher than the commercial sorbents. Second composite of this kind was CF-Ag; silver particles were able to kill the harmful microorganisms, like E-Coli. The Slovak and international patent applications were filed for the composite CF-Fe and the composite CF-Ag is ready for patenting.



The structure of composite CF-Fe: Nano- and microparticles of $Fe(OH)_3$ are deposited on the surface of microporous carbon fibers, prepared by carbonization of delignified cellulose.

2.6.2. List of the most important studies commissioned for the decision-making authorities, the government and NGOs, international and foreign institutes

Research Scientists from the Polymer Institute are regularly evaluating also projects for foreign grant agencies.

Name	Agency/programme	Number	Year
Bleha Tomáš	for Agency REA, EC Brussels: programme SME programme Marie Curie programme MSC	10 20 7	2012 2014
Danko Martin	National Science Centre (NCN) Poland	2 2	2012 2014
Chodák Ivan	National Research Foundation of South Africa National Research Foundation of South Africa	1 1	2014 2015
Lacík Igor	Germaine de Stael, Switzerland MSc programme, Qatar	1 1	2012
Kroneková Zuzana	National Science Centre (NCN) Poland	1	2014
Mosnáček Jaroslav	National Science Centre (NCN) Poland	2 2 1	2012 2014 2015
Omastová Mária	Slovenian Research Agency Czech Science Foundation	6 1	2014 2015

2.6.3. List of contracts and research projects with industrial and other commercial partners, incl. revenues

1. Contract title: **Determination of rate coefficients of water-soluble monomers with special emphasis on charged/ionizable monomers** and **Kinetic coefficients and models for existing and future polymerization processes and systems at BASF** partner: BASF, Ludwigshafen, Germany, duration of the cooperation: 06.2004–08.2018; revenue:: 135 000 EUR
2. Contract title: **Technological procedure for preparation of poly(L-lactide) (PLLA) by polymerization of L,L-dilactide (L-Lactide, L-LA) with defined properties;** partner: Tau-Chem, s.r.o., Bratislava, Slovak republic; duration of the cooperation: 01.2012-12.2012; revenue: 4 000.00 €
3. Contract title: **Monomers for adhesive polymers in dental composites;** partner: IVOCLAR VIVADENT, AG. Schaan, Liechtenstein; duration of the cooperation: 04.2012-05.2015, revenue: 67 687 €
4. Contract title: **New phase change materials with improved heat transfer properties;** partner: Qatar University, Doha, Qatar; duration of the cooperation: 08.2011-04.2012; revenue: 10 400.00 €
5. Contract title: **Production of connections to chemiluminiscence device for UV irradiation;** partner: DSM Geleen, The Netherlands; duration of the cooperation: 06.2012-09.2012; revenue: 7 300 €
6. Contract title: **Construction of Lumipol 3;** partner: Queensland University of Technology, Brisbane, Australia; duration of the cooperation: 06.2012-02.2013; revenue: 24 500 €
7. Contract title: **Hodnotenie parametrov elektrovodivých nanosólov (Evaluation of electrically conductive nanosols parameters);** partner: VÚTCH-Chemitex s.r.o. Žilina, Slovak Republic; duration of the cooperation: 09.2012-02.2014; revenue: 10 000 €
8. Contract title: **Lepenie UZ meničov (Bonding of ultrasound transducers);** partner: Ecoson, spol s r.o., Nové Mesto n.V, Slovak Republic; duration of the cooperation: 01.2012-12.2015; revenue: 16 077 €
9. Contract title: **Elektricky vodivé adhezívum Gravipol Electro (Electrically conductive adhesive Gravipol Electro);** partner: SOS Electronic spol. s r.o., Košice, Slovak Republic; duration of the cooperation: 01.2012-12.2015; revenue: 6 380 €
10. Contract title: **Štúdium vplyvu zvýšenej teploty na mechanické vlastnosti membránových zmesí na báze butylkaučuku ako dôsledku úbytku zmäkčovadiel (Study of high temperature effect on mechanical properties of membrane blends based on butyl rubber as a result of plasticizers loss);** partner: Continental, a.s. Púchov, Slovak Republic; duration of the cooperation: 12.2015-05.2016; revenue: 10 000.00 €

2.6.4. List of licences sold abroad and in Slovakia, incl. revenues

2.6.5. List of most important social discourses under the leadership or with significant participation of the institute (max. 10 items)

2.6.6. Summary of relevant activities, max. 300 words

The significance of PI SAS and, consequently, the impact of PI SAS on community can be demonstrated in several areas. The label “PI SAS” is well-known by its professionals and provided expertise and solutions at the national and international level. This has been leading to numerous collaborations with the impact on the outcomes of a number of partners from academia and industry. PI SAS is the member of Plastics Cluster Slovakia and Automotive Cluster Slovakia, which gives the opportunity to closely communicate with the stakeholders in the polymer-related fields. The researchers of PI SAS actively work in national and international chemical societies, various scientific committees, agencies, ministries and other bodies with the impact on community

and society. PI SAS influences the life of young generation (high school students, undergraduate and graduate students) by education in polymer science and the science in general. By popularization activities PI SAS reveals to the lay public the important role of polymer materials on the human society and well-being from controlled drug delivery, biomaterials that save life to exploring the space. Overall, in Slovakia the polymer science principal institutions are PI SAS and the Institute of natural and synthetic polymers of the Faculty for Chemical and Food Technology, Slovak Technical University. Therefore the social impact of PI SAS is understood as both the opportunity and responsibility to guarantee all the aspects related to the polymer science.

2.7. Popularisation of Science (outreach activities)

2.7.1. List of the most important popularisation activities, max. 20 items

1. OPEN DAY on PI SAS, Duration: November, 2012 – 2015
2. EUROPEAN RESEARCHER'S NIGHT – Festival of science, Duration: September, 2012 – 2015
3. EXCURSIONS for high school and university students, Duration: 2012 – 2015
4. Science has a future 2015, PI SAS, 18.5.2015: Excursion and lectures for high school students
5. Supporters of CHEMGENERATION.ORG – support all young scientists by BASF project FUTURE HEROES in Chain reaction http://slovensko.rtvs.sk /clanok/spolocnost/reta zovareakcia?currentPage=4 13.12.2013, final award ceremony
6. Participation on Exhibitions: Incheba Expo Bratislava, Agrokomplex Nitra, Coneco-Racioenergia, Vernisage NEW FUTURE, TEXTILE ART OF TODAY, etc.: Duration: 2012 - 2015
7. Igor Lacík: lecture "Polymer microcapsules: will we help the diabetes treatment?" in Club of talented students, FChPT, STU, Bratislava, 7.11.2012
8. Mária Omastová: TV document „Spectrum of Science" on RTS - STV 2, 27.10.2013
9. Zuzana Benková, PhD. Article title: Run and Chemistry In Quark, vol. 8, 2013, p. 8-9
10. Igor Novák, Ondrej Žigo, Application of polymer materials for cars, article in Strojárstvo Strojírenství – vol. 17, p. 50-51. 12, 2012
11. Juraj Kronek exhibition "Coloured to blue" in ÚĽUV gallery, Bratislava, 25.9.2014
12. Igor Lacík lecture "How the PI SAS may make the life for diabetic patients easier? In Scientific Coffee-Bar SAVinci, Bratislava 4.03.2014
13. Igor Lacík lecture "New ways to treat diabetes" on Bratislava diabetes day, 18.10.2014
14. Igor Lacík and the team TV reportage "Diabetes treatment by encapsulated islets." SITA, internet reportage teraz.sk, http://www.teraz.sk/tera ztv/veda-tu-a-terazcukrovka-lacik/ 102377-clanok.html 19.10.2014
15. Filip Rázga, Lucia Uhelská, e-news "They know how to treat diabetes." http://velkenoviny.joj.sk /noviny-archiv/2014-10- 24-velke-noviny-tvjoj.html 24.10.2014
16. Filip Rázga, Igor Lacík, article "The hope to treat diabetes typ I" in journal Zem a vek, p. 85, 2014
17. Ivan Chodák, TV news, „Short commentary to transformation of Slovak Academy of Sciences to public research organization", RTVS, 20.11.2015
18. Mária Omastová, lecture "Polymer nanocomposites and their applications." in CVTI, Bratislava 29.10.2015
19. Filip Rázga in „Club of action heroes", CVTI, Bratislava 2015
20. Anna Zahoranová in radio discussion: Focus on graduate students, RTVS 10.12.2015

2.7.2. Table of outreach activities according to institute annual reports

Outreach activities	2012	2013	2014	2015	total
Articles in press media/internet popularising results of science, in particular those achieved by the Institute	10	24	7	6	47
Appearances in telecommunication media popularising results of science, in particular those achieved by the Institute	4	5	3	6	18
Public popularisation lectures	17	33	17	28	95

- **Supplementary information and/or comments on popularisation activities, max. 300 words**

PI SAS realizes the importance of popularization activities to promote the scientific achievements and activities of the Slovak Academy of Sciences and PI SAS specifically. The dissemination of information to lay public is therefore among the priorities of PI SAS. The visits of students, teachers, visitors, companies, Open Days, Nights of Researchers, popularization articles, appearance in TV and radio broadcasting, dedicated documentary movies become standard outcomes of the PI SAS researchers at all levels from PhD students to senior scientists. The non-profit foundation Cukrovka (www.cukrovkanf.sk) has been established at PI SAS to communicate on our studies into diabetes treatment by encapsulated cells. These activities demonstrate that the science at PI SAS provides the data and a suitable language to speak to lay public has been found and, vice versa, that the lay public is interested in these results. This communication is highly stimulating and has to be further intensified.

2.8. Background and management. Human resources and implementation of recommendations from previous assessment

2.8.1. Summary table of personnel

Personnel	2012	2013	2014	2015
All personnel	87,0	90,0	87,0	83,0
Research employees from Tab. Research staff	61,0	63,0	60,0	63,0
FTE from Tab. Research staff	42,550	44,120	47,720	43,580
Average age of research employees with university degree	43,5	42,7	44,1	42,9

2.8.1.1. Professional qualification structure (as of 31.12. 2015) FEMALE

FEMALE	AGE								
Number of	< 30	31 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	> 65
DrSc. / prof.	0	0	0	0	0	1	0	0	0
II.a / Assoc. prof.	0	1	1	0	0	0	1	0	0
Other researchers PhD./CSc.	5	8	6	0	0	0	0	0	0
doc. / Assoc. prof.	0	0	0	0	0	0	0	0	0

2.8.1.2. Professional qualification structure (as of 31.12. 2015) MALE

MALE	AGE								
Number of	< 30	31 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	> 65
DrSc. / prof.	0	0	0	0	0	1	0	2	4
II.a / Assoc. prof.	0	0	4	5	0	0	0	1	0
Other researchers PhD./CSc.	0	0	0	1	1	0	0	1	0
doc. / Assoc. prof.	0	0	0	0	0	0	0	0	0

2.8.2. Postdoctoral and mobility scheme

2.8.2.1. Postdoctoral positions supported by national and international resources

1. Katarína BORSKÁ, 1.9.2013-31.8.2017 (1.5.2014-30.6.2014 – paid from project ERDF – POLYFRIEND, HUSK/1101/1.2.1/0209)
2. Klaudia CZANIKOVÁ, 1.9.2013-31.3.2016 (1.9.2013-30.4.2014 – paid from ERDF – POLYFRIEND, HUSK/1101/1.2.1/0209)
3. Anita ECKSTEIN, 1.10.2012-31.5.2016 (since 1.6.2016 - senior research scientist)
4. Maria Lorena FALCO, 1.12.2013-30.9.2014 – paid from ERDF – POLYFRIEND, HUSK/1101/1.2.1/0209
5. Markéta ILČÍKOVÁ, 1.9.2013-31.8.2015 (since 1.9.2015 – senior research scientist)
6. Lucia KLEŠČÍKOVÁ, 1.9.2015-31.8.2016
7. Juraj KRAJČI, 1.9.2013-28.2.2014 – paid from project EU SF - VIPO a.s., no. 26220220173

8. Miroslava LUKEŠOVÁ, 1.9.2015-31.8.2018
9. Miroslav MRLÍK, 1.7.2013-31.8.2013 – paid from ERDF – POLYFRIEND, HUSK/1101/1.2.1/0209
10. Daniela MORAVČÍKOVÁ, 1.10.2013-31.8.2016 (1.10.2013-30.9.2014 – paid from ERDF – POLYFRIEND, HUSK/1101/1.2.1/0209)
11. Katarína MOSNÁČKOVÁ, 1.10.2012-31.8.2019 (1.10.2012-30.9.2014 – paid from project ERDF – POLYFRIEND, HUSK/1101/1.2.1/0209)
12. Andrea ORAVCOVÁ, 1.9.2012-31.12.2014 – paid from project EU SF - VIPO a.s, no. 26220220173
13. Eva PAPAJOVÁ, 1.9.2012-31.10.2013 (1.3.2013-31.10.2013 – paid from ERDF – POLYFRIEND, HUSK/1101/1.2.1/0209)
14. Anton POPELKA, 1.10.2012-31.8.2014
15. Filip RÁZGA, 1.7.2013-31.12.2013 (since 1.1.2014 – senior research scientist)
16. Michaela SEDNIČKOVÁ, 17.3.2014-31.8.2016 (17.3.2014-30.9.2014 – paid from project EU SF - VIPO a.s., no. 26220220173)
17. Vladislav SEMAK, 1.2.2012-31.7.2013
18. Patrik SOBOLČIAK, 1.10.2012-31.8.2014
19. Alena ŠIŠKOVÁ, 1.9.2013-31.8.2018
20. Dušana TREĽOVÁ, 1.9.2013-31.8.2017
21. Marian VALENTIN, 1.9.2013-31.8.2015

2.8.2.2. Postdoctoral positions supported by external funding

1. Miroslav MRLÍK, 1.9.2015-31.12.2015
2. Michal SEDLAČÍK, 4.3.2013-30.4.2013
3. Piotr RYCHTER, 7.1.2014-30.4.2014
4. Anatoly NIKITIN, 1.8.2015-30.9.2015
5. Anna PIDLUZHNA, 1.2.2015-30.10.2015

2.8.2.3. SAS stipends and SASPRO stipends

1. Filip RÁZGA - 7.4.2015 - 6.4.2018
2. Zoran MARKOVIC - 1.12.2015 - 30.11.2018

2.8.2.4. Internal funding - the Slovak Academy of Sciences Supporting Fund of Stefan Schwarz

1. Matej MIČUŠÍK - 1.5.2011 - 30.4.2015
2. Anita ECKSTEIN - 1.1.2014 - 31.12.2018

2.8.3.Important research infrastructure *(max. 2 pages)*

The existing research infrastructure can be considered as sufficient for achieving the R&D objectives of PI SAS. In the last years the infrastructure has significantly improved thanks to the Structural funds EU, the FP programs and various contracts. Several instruments, such as portable Raman spectrometer with NIR module, Brabender Plasticorder, electrospinning set up, Instron and GPC systems, were purchased from structural funds also during the assessed period. Here is some highlighted infrastructure of the institute:

Department for Biomaterials Research

Pulsed-laser for PLP-SEC studies - max pulse-repetition rate 500 Hz; determination of propagation rate coefficients

FTIR spectrometer - ATR modules, photoacustic chamber, heating chamber, NIR region

Electrografting - grafting of (meth)acrylates onto electro(semi)conductive surfaces at inert dry atmosphere

Size-exclusion chromatography - absolute molecular weights and their distributions for wide range of polymers

HPLC system - UV detection, isocratic pump, C18 column

Differential Refractometer - accurately measures the precise specific refractive index increment value (dn/dc) required for any light scattering analysis or the determination of polymer parameters

Texture analyzer – TextureAnalyzerTA 2Xiwithsoftware Texture Expert is used for determination of mechanical characteristics of hydrogel materials. This is an evaluation where a material is subjected to a controlled force from which a deformation curve of its response is generated.

Fluorescence microscope - used to study properties of organic or inorganic substances using the phenomena of fluorescence and phosphorescence

Department of Composite Materials

XPS K-Alpha - chemical composition determination

DRS Novocontrol - dielectric properties of materials, electrical conductivity, large temperature region

DMA Q800 TA Instruments - dynamic mechanical properties

Rheometer AR2000 TA Instruments - rheology of liquids and melts

Tensiometer K100 Kruss - free energy of solids and liquids

Nanoindentor Hysitron TI-750 - complex mechanical behaviour of solid surfaces

Microcompounder DSM - preparation composites and blends in molten state

Plasma generators - plasma treatment of foild, textiles and powders

Surface Energy Evaluation System - contact angles measurement

Universal testing machine - Instron and Shimadzu - mechanical properties in tensile, shear and bending mode, large temperature region

Calander Nishimura - mixing of rubbers and compositions based on rubbers with different additives

Purchased during the assessed period:

Hydraulic press LabEcon 300 - molding of polymeric materials into sheets or strips

Brabender Plasticorder - preparation of composites and blends in molten state

CEAST, Instron, CEAST, model 9340, Droptower Impact System - Device for instrumented impact tests with energy from 0.3 to 405, equipped with accessories for testing of films and plates.

Cooling/heating measuring table for Nanoindentor Hysitron TI-750

Department of Synthesis and Characterization of Polymers

Thermal stability and flammability LUMIPOL- 3 – Determination of chemiluminiscence – Study of oxidation extent and termal decomposition and stability of polymers and nonvolatile compounds.

Cone calorimeter - Modern device used to study the fire behavior of small samples of various materials in condensed phase

Liquid Chormatograph GPC mode HPLC - critical, limiting condition - evaporating, RI, fluorescence detectors

UV-Vis spectrometer Shimadzu UV-1650PC – UV-VIS spectra in the range of 210 – 1100 nm

Fluorescence spectrofluorophotometer Shimadzu RF-5301 PC – fluorescence spectra - standard steady state fluorimeter; solid sample holder; thermostated holder for 1x1 cm cuvette

Becker&Hickl TCSPC modular equipment - Ultra-fast TCSPC module with multi-wavelength detection-16 simultaneously recording wavelength channels for spectral resolution, Spectral range 300-850 nm, resolution 180 ps; Pulsed diode laser-wavelength 375 nm, Pulse width downto 60ps, repetition rate 20-50-80 MHz; Different type of samples – liquid, films (excitation angle 25-90°)

Ocean Optics QE 65000 – Multipurpose highly sensitive optical light detector (range of 200-1200 nm) with optic fibre input. Laser diode excitation source 405 nm equipped by optical fibre output.

Gas chromatography FOCUS gas chromatograph – gas chromatograph equiped with FID detector for analysis of organic compounds up to temperature 350°C

Zetasizer Nano ZS - Dynamic Light Scattering - It is used for the measurement of the size, electrophoretic mobility of proteins, size and zeta potential of colloids and nanoparticles.

Sigma 3-30K Refrigerated Centrifuge - High speed refrigerated bench top centrifuge for maximum speed 30000 rpm, gravitational fields more than 65000 × g

Purchased during the assessed period:

Raman spectroscopy iRaman Plus – Raman portable spectrometer with 532 nm excitation laser (min 50 mW) and 3.5 cm^{-1} resolution equipped with microscope and NIR module

Size-exclusion chromatography Agilent – quaternary pump, autosampler, RI detector - molecular weights and their distributions for wide range of polymers

Department of Molecular Simulations of Polymers

High performance Linux cluster computer - cluster of servers, 150 CPU units

Regarding the large instruments, the infrastructure at PI SAS can be considered as being close-to saturated with respect to the capacity of researchers operating the instruments. Thanks to infrastructure purchased during the recent years from projects of EU structural funds, many new collaborations with other institutes of Slovak Academy of Sciences

In addition to the PI SAS infrastructure, the scientists and doctoral students have an access to measurements on other special techniques through collaboration with the SAS institutes and universities, all equipped with new infrastructure mainly from the Structural funds EU. A number of specific measurements and training is performed via the international collaboration.

Concerning the computer equipment the situation is at a good level. PI SAS possesses about 80 PCs connected with network of the Slovak Academy of Sciences. There is a free access to Internet from all PCs and as a rule every creative researcher is in the network from his/her desk. Through the consortium of several Slovak universities, PI SAS has an access to scientific databases such as WOS, Scopus, Science Direct, Wiley, Springer and Reaxys. As far as high performance computing is concerned, the respective PI SAS teams have cluster of servers and

have access to larger computers through the network especially for molecular modeling of polymeric systems.

The PI SAS research activities are strongly supported by the Economical and technical department with its thorough and flexible assistance with economical and accounting issues, IT, public tenders, facility management, and library.

2.8.4. Description of how the results and suggestions of the previous assessment were taken into account

Based on partial indicators reflecting the research output, response to the research output, position in international and national context, project structure and external funding resources, education, socio-economic impact, popularization of science and personal management, the overall evaluation of PI SAS in 2012 states:

(i) the institute fulfilled all qualitative and quantitative criteria of excellence in a given research area,
(ii) the institute is internationally well recognized organization, and
(iii) the excellent fundamental research has also close links to application sphere,

and the institute was accredited in category A.

The evaluation panel made three suggestions (see below), which have been considered and at least partly implemented by the institute management in the current period. In principle, all three suggestions focus, from different angle, on human resources with respect to the younger generation. This is logical as the personal management involving the young generation is the basis of present and future situation at PI SAS. Our institute is now truly “young” with the average age of researchers of about 43 years in the last years. This can be read as the young generation of scientists is attracted by the opportunity to be employed at PI SAS. This reflects one of the priorities of the institute management to provide the opportunity for young researchers to connect their professional life with PI SAS and, *vice versa*, to create for young generation suitable work conditions and training, and to provide the career growth and perspectives.

The response to these suggestions is given below in italics.

1) The good quality of the relationship with industrial partners could be developed in the direction of the technological transfer by helping young researchers or postdoctoral fellows to create new activities in connection with the main research items of the institute (start-up companies, etc.).

   This suggestion consists of two points: the technology transfer and, by this, the support of new activities of young researchers taking part in the technology transfer up to the start-up companies. The partnership with the industrial partners leading to technology transfer has been strongly supported by the PI SAS management. Any cooperation in line with the profile of institute has been supported with the option that only 20 % overhead is taken from the external resources, which is a generous option compared to institutions similar to ours. This gives the opportunity to organize the financially self-supporting teams consisting also of young researchers, which has been a common practice. Nevertheless, the ideal case leading to a start-up company, and, moreover supporting by these activities a young researcher, has not yet happened. This is partly due to intellectually not having such a product and partly due to non-existing legislation allowing for creating the start-ups associated with PI SAS. In case both these conditions are fulfilled, the institute management will support these activities.

2) Organization should apply more effort to attract foreign PhD students and postdoctoral fellows, to not only preserve but enhance the reputation it has in the scientific community. This could perhaps be achieved by increasing attractiveness of such positions financially by

setting aside funding for this particular purpose, a percentage of grants individual groups obtained.

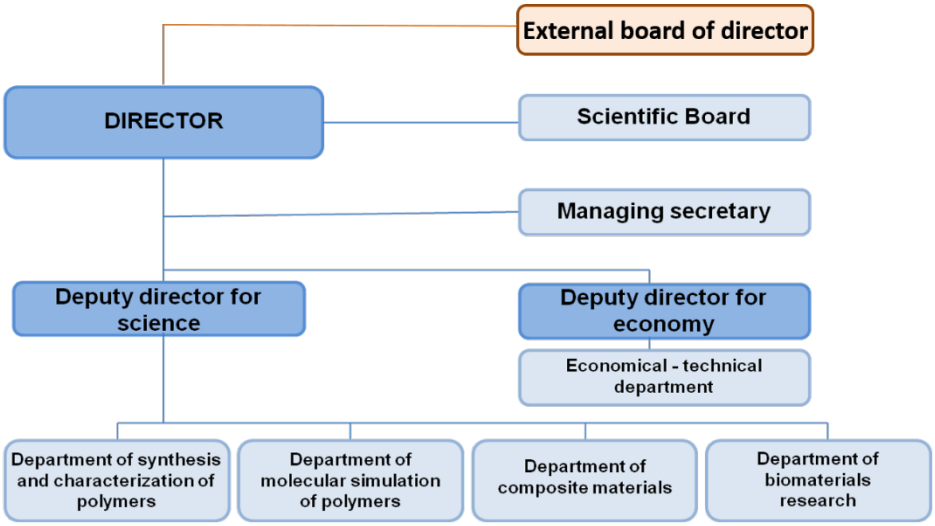
The internationalization of the institute with respect to postdoctoral fellows and visiting PhD students has been improving. The institute, under current situation, was unable to set aside the grants required to attract dedicated and high-level foreign PhD students and postdoctoral fellows. On the other hand, several systematic steps have been made with the main ones listed below. Firstly, the institute actively entered The Programme SASPRO - Mobility Programme of the Slovak Academy of Sciences, which resulted in granting three successful applicants for the institute out of about fifty applicants in total for the SAS. This represents a critical mass of high-quality postdoctoral fellows, whose role is to accomplish a high quality research for the institute and SAS as well as to influence the young generation of researchers in their environment. Secondly, the lead researchers at the institute regularly apply as the hosting researchers within the SAIA National Scholarship Programme together with the applicants being MSc or PhD students up to the research professors. Thirdly, the open positions for the post-doctoral positions have been regularly posted via the hiring organizations and the webpage of the institute in order to provide the opportunity for a gifted young researcher to offer the research position at the institute from Slovakia or abroad. This has resulted in rather significant exchange of young researchers in the last years, including the foreign countries. Recently the activities were initiated towards cooperation with the Shanghai University in order to provide the opportunities for the student exchange also with this part of the world.

3) Organization should continue in increasing the quality of research results and education of new PhD students.

The increased in quality of research results and education of new PhD students have been our priorities and as such they are included in the mission of PI SAS. Our institute is the external institution, associated with the universities in Bratislava, to educate PhD students in several scientific fields related to the polymer science. In the last years, there have been an increased number of candidates applying for the PhD studies at our institute, from which we typically select 3-4 students. The regular evaluation of the progress of the PhD study is carried out by the Scientific board. Not all the students finalize their thesis for various reasons (the quality is one of them), nevertheless, those who finalize the thesis and obtain the PhD degree from our institute are ready to undertake the post-doctoral or company positions.

- **Supplementary information and/or comments on management, research infrastructure, and trends in personnel development**

The management and organization structures of the Polymer Institute SAS set in 2011 to the current situation is considered as sufficiently effective for scientific and organization management of the institute. The protocols and procedures have been established and are updated to solve the rising issues. In 2015 the External Board of Director has been added as a new element to the management structure. This board is created by four established foreign researchers (Austria 2x, Hungary 1x, Czech Republic 1x; the selection follows the scientific profile of the institute) and one representative from industry. The role of the External Board of Director is to provide the professional external opinion on the overall situation at the institute that, apart from the accreditation, has been missing in the past.



Organization structure of PI SAS

The research infrastructure is generally at the sufficient level to generate the competitive research data. This statement holds true for the infrastructure at PI SAS that is complemented with the infrastructure of cooperating institutions at the SAS and/or the universities and research centers in Slovakia and near surrounding. At the same time, the running cost and renewal of aged infrastructure represents the problem that needs to be solved. The resources for capital expenses needed for the equipment of daily use (spectrometers, chromatographs, balances, etc.) are practically non-existing as the capital expenses are non-eligible expenses in the national calls and the agency providing such means is non-existing so far. The institute has identified the list of urgent infrastructure for purchase/replacement that is planned to be obtained either from new calls focused on infrastructure or from the contracts. The potential for opening new laboratory space is seen in some of the rooms in the Technological unit of the Polymer Institute SAS, which will need to be fully renovated.

The institute management realizes that the institute outcomes depend solely on the personnel available at each position (research, management, support). We do wish to closely follow the trends in the personnel development with the specificity for the scientific environment, which is achieved by dedicated training of the presentation and writing skills, by learning the strategy for approaching the tasks and solving the scientific questions, by stressing the role of individuals, by learning and training the consistency, precision, and, generally, planning the scientific career. All of this has been discussed at the scheduled as well as informal meetings between the institute management and the PhD students as well as at the meetings of respective departments. Unfortunately the institute management has so far not been able to dedicate the significant external resources for training in personnel development by commercial companies (note: this is the case also in cooperating institutions abroad) and, hence, the training is more “by doing” and strongly depends on the activities of the individuals to take care of their personal development.

3. Research strategy and future development of the institute for the next five years (2016-2020) (Recommended 3 pages, max. 5 pages):

3.1. Present state of the art in both the national and the international contexts

The research strategy and future development of PI SAS in the period of the next five years follow the mission and vision of the institute. The mission is built on four pillars with respect to the polymer science, which, in brief, include expertise, education, cooperation, and dissemination. The vision is to achieve the true recognition in European and world polymer science and to demonstrate the usefulness to both professionals in the polymer science and the lay public nationally and internationally.

The management of PI SAS realizes that these tasks and goals are specific to the conditions in Slovakia. On one hand these appear to be constantly difficult with respect to, for example, the sufficient number of highly qualified personnel, recognition and perspective of the research career, competitive environment, and multi-source grant system with sufficient financial resources. Yet, on another hand, these conditions provide the opportunities to implement a "established" culture to the scientific work in the Slovak environment (that is not yet fully implemented and is still influenced by the history), which is known from strong teams around the world and is based on excellence, visibility of the scientific outputs and competing environment.

The PI SAS is having a good position and recognition at the national and international levels thanks to the research achievements as well as dissemination of results in the lay public domain. The results achieved in the period from 2012 to 2015 and expressed by the partial indicators are significant and may lead to the trend to maintain the steady conditions. Obviously, while the satisfaction is acceptable, the steady conditions cannot be adopted by the scientific community, which is driven by motion in formulating and solving new ideas. Our goal for the next period is to further enhance the significance of PI SAS in the polymer science area globally, since the measure of quality of PI SAS is equal to its position among the foreign institutions working in the polymer science. Some new moments to the PI SAS life in the next period can be introduced by a higher flexibility in the financial management after transformation to the public research institution.

3.2. Research strategy of the institute in the national and the international contexts, objectives and methods

Project proposals submited to 7RP or H2020	2012	2013	2014	2015
Institute as coordinator	0	0	0	0
Institute as participant	7	2	10	5

The research strategy, objectives and methods for the future development consists of several parts:

Personnel:

The principal condition is to educate and/or hire dedicated, smart, and devoted scientists who are excited by the polymer science and wish to connect their career with PI SAS. The task of the institute management will be:

1. to actively recognize and attract such scientists and to create for them the conditions for a required time. Such scientists will be expected to bring new ideas to PI SAS, to create the teams and to be successful in the competition for national and international funding.
2. to continue in already established and applied regular evaluation of researchers with the focus on the career of those after obtaining the PhD degree until the age of about 40.
3. to follow the strategy of having a sufficiently high number (above the critical mass of ~10 scientists for the current size of the institute) of true core leaders capable of building, supporting and leading the teams and research topics. The schemes like The Programme SASPRO - Mobility Programme of the Slovak Academy of Sciences will be utilized in these efforts with the vision to be successful also in the international calls, the EU H2020 schemes included.
4. to establish the conditions with an increased number of project-employed post-doctoral scientists and PhD students, who will be employed at the institute temporarily with the perspective that the best will be selected to become the core leaders. The number of PhD students and post- doctoral scientists should with time exceed the number of core leaders, i.e. as it is seen in the “classical” scientific institutions abroad.
5. to try to create the financial support for those who will significantly contribute to the scientific outcomes. This should be done hand-in-hand with the strategy and tools imposed by the Slovak Academy of Sciences and the government in order these plans could become a reality.
6. to support the personnel growth and training for young generation of scientists. We will continue in organization of the annual competition for the best paper and the start-up grants.
7. to promote the mobility of young researchers and obtaining the experience from the foreign laboratories (compulsory long-term stay at the beginning of career).

Research topics:

So far the PI SAS management gives to its research employees relative freedom as soon as the research topics are within the institute interest and profile of activities. These activities include polymer synthesis and characterization, polymer biomaterials, polymer composite materials and molecular simulation of polymers. Currently the institute suffers from rather high fragmentation, which is given by the need to financially support the research cost by close-to any means, which results in a high number of projects on a high number of topics. The improvement for the next years is seen in identification and focus on several leading topics combining the knowledge and interest of a large fraction of the institute. The management together with current leaders will work on this strategy in the next years to reduce the number of projects with a massive administrative burden. This strategy should result in a more significant contribution to the polymer science and a strengthen position and recognition of PI SAS globally.

Research environment:

The strategy for improving the research environment in terms of infrastructure and work conditions will be based on the true needs of PI SAS reflecting the current and future trends and research topics in the polymer science. This strategy will not follow the principle to purchase what is fashionable but more to obtain what is needed with the option to cooperate with those who possess the complementary infrastructure.

1. Either purchase or replace the medium cost equipment necessary for everyday work.
2. The plan for major infrastructure to be formulated in case the institute succeeds in obtaining the structural funds or projects in calls allowing for purchasing the major infrastructure.
3. Reconstruction and renovation of some rooms in the Technological unit of PI SAS with the possibility to create new synthetic, analytical and biological laboratories.

International recognition:

There is a number of cooperation with academia and industry both nationally and internationally that speak for a good level of recognition in the field of polymer science. However, although some researchers are well-recognized internationally, and with them the PI SAS as their affiliation, the international recognition has to be further improved in the next years. The ways to accomplish this task generally exist and will be promoted by the institute management:

1. Publishing a high-quality work in a high-quality journals (indexed in WOS databases)
2. Presentations at the high-reputation international conferences
3. Invited presentations at the high-reputation international conferences and research centers
4. Personal contacts based on the post-doctoral positions
5. Organization of international conferences

All these activities will involve a larger number of researchers than presently by identification of those from the younger generation.

4. Other information relevant for the assessment:

This assessment represents the summary and highlights of activities of the Polymer Institute SAS in years 2012-2015. We understand the need for this accreditation from the point of view of legislation as well as of regular evaluation of institutions in order not only to summarize but mainly to identify the points that may be critical for the future of the institution. The PI SAS management believes that the material contained in this assessment fulfills the expectation and will lead to identification of both stronger and weaker features. We are aware of them, yet, their formulation by the Accreditation committee will create the formal basis for discussion of the follow-up steps at the PI SAS as well as with SAS and related ministries to move the science in Slovakia to a higher level.

Bratislava Ing. Igor Lacík, DrSc.

Director