Tomas Bata University in Zlín

Science Activity Annual Report

2016

CONTENT

1 DEFENDED DOCTORAL THESES

In 2016, a total of 31 theses were defended:15 at the Faculty of Technology, 8 at the Faculty of Management and Economics, 5 at the Faculty of Applied Informatics and 3 at the Faculty of Multimedia Communications.

1.1 Faculty of Technology

Degree Programme: CHEMISTRY AND MATERIALS TECHNOLOGY

Degree Course: Technology of Macromolecular Compounds

Thomas Haenel, Ph. D.

Date of defence: 13. 9. 2016

Supervisor: Ing. Berenika Hausnerová, Ph.D.

Curing of Visible Light Curing Resin Based Dental Composites

Abstract

During the last 50 years, a broad range of visible light curing resin based composites (VLC RBC) was developed for restorative applications in dentistry. Correspondingly, the technologies of light curing units (LCU) have changed from UV to visible blue light, and there from quartz tungsten halogen over plasma arc to LED LCUs increasing their light intensity significantly. In this thesis, the influence of the curing conditions in terms of irradiance, exposure time and irradiance distribution of LCU on reaction kinetics as well as corresponding mechanical and viscoelastic properties were investigated. Different experimental methods were used to determine time dependent degree of conversion (DC), depth of cure (DoC), hardness distribution and post-curing kinetics. Dynamic mechanical indentation technique was implemented on a dynamic mechanical analyzer to determine local viscoelastic properties on a scale of 100 to 300 (mikro)m. To evaluate the data several quantitative approaches were applied. A novel DC-function based on a time dependent reaction constant is presented to produce intrinsically final DC-values less than 100 % and better representation DC-data. The novel DC-function shows that the kinetics of the curing reaction is mainly determined by the reaction time constant which depends on the irradiance of the LCU. The DC reached 45 % after time corresponding to the reaction time constant.

It was shown that the reaction rate depends on the square root of irradiance for the investigated composites. A new method to determine DoC in a user-independent and automatized manner was presented which can be applied to any depth dependent property of light curing composites. Due to the mathematical description, the properties at DoC have decreased to 88 % of their plateau values, and are thus not arbitrary. Furthermore, the irradiance distribution of the LCU is reflected in the distribution of mechanical properties. Longer exposure times increase the hardness level, but do not level out the imprinted patterns. This is in accordance with long term hardness measurements revealing that the kinetics of the post-curing has a logarithmic time dependency, and is also determined by the locally introduced irradiance. Samples irradiated with different exposure times produced hardness curves which could be shifted to a master curve on the logarithmic time axis allowing for long term predictions of the hardness, and indirectly the DC.

Ing. **Barbora Hanulíková**, Ph.D.

Date of defence: 29. 6. 2016

Supervisor: doc. Ing. et Ing. Ivo Kuřitka, Ph.D. et Ph.D.

Electronic properties of polysilylenes studied in silico on oligomers in various conformations

Abstract

Polysilylenes are materials that have potential application as active layers in electronics, active optical elements, photo- and electron resists, macroinitiators, ceramic precursors etc. Their properties are significantly affected by conformation of their backbones because their (sigma)-electrons are conjugated and thus any modification of a backbone arrangement involves corresponding response in (sigma)-conjugation extent and any change on the electron level naturally causes an alteration in final material properties. One of the causes definitely influencing the (sigma)-conjugation is a conformational defect in the backbone that can be represented by some kind of a bend. However, bends are inevitable parts of chains of any polymers as they can be regarded as sites, which enable backbone folding into a regular arrangement or to the contrary can increase random disorder. This doctoral thesis is focused on the theoretical description of electronic properties of alkyl- and aryl-substituted oligosilylenes which are significantly dependent on the structural arrangement

of their silicon backbone. The main aim of the work is modelling of a conformational defect, which comprises a kink in the chain. The excitation process was evaluated in such disrupted structures in neutral and charged (polaron modelling) molecules. Furthermore, stabilization of a kink by non-bonding interactions was also considered. The goal was to discover if this kink is viable type of defect, which can occur in real polysilylene chains. Density functional theory was used as a tool for investigation of geometry and electronic properties of several sets of oligosilylene structures up to tridecamers with and without an introduced kink. Conformational studies, which were performed mainly on tetrasilylenes with various side groups, were indispensable part of the work. The choice of model side groups was pointed towards selection of practically relevant and most reported polysilylene materials in experimental literature as poly(dimethyl)silylene, poly[cyclohexyl(methyl)silylene] and namely poly[methyl(phenyl)silylene]. The thesis has been prepared as a thematically arranged collection of papers published with accompanying texts.

Kadir Özaltin, Ph.D.

Date of defence: 30. 11. 2016

Supervisor: prof. Ing. Petr Sáha, CSc.

Bioactive polymer surfaces based on polyethylene

Abstract

Polymeric biomaterials are widely used besides metals, ceramics and composite biomaterials due to their easy processability, low cost and favourable physical and chemical properties. However, their surface properties does not often meet optimal level. Due to this fact, the surface modification of polymer materials used as a medical devices is of a paramount importance during the processing. Such modification can be done via several available methods. Besides flame treatment, UV irradiation and wet chemical etching by strong acids, the most advantageous method is plasma surface modification both from economical point of view and is environmental friendly. Further processing of such modified material leads to the creation of layer with bioactive and intelligent properties in terms of the interaction between the synthesized biomaterial and cells.

Ing. **Tomáš Plachý**, Ph.D.

Date of defence: 29. 6. 2016

Supervisor: doc. Dr. Ing. Vladimír Pavlínek

Preparation and properties of materials for intelligent systems

Abstract

Stimulus-responsive materials, often referred as intelligent systems, are of high interest for their unique controllable properties. As an external stimulus mainly pH, UV light, electric or magnetic fields are involved. A branch of intelligent systems which change their physical properties upon an application of external electric or magnetic fields are called smart fluids. Firstly, the electrorheological fluids were discovered by Winslow [1], who observed the formation of fibrous structures formed from electrically polarizable particles within the liquid medium in 1948. In the same year, Rabinow has observed the same phenomenon with magnetic particles in the liquid medium, and invented the magnetic fluid clutch [2]. Since their discovery the smart fluids have been a matter of an intensive research in many research groups. In the case of electrorheological fluids, their rheological parameters can easily be controlled through an application of an external electric field. Such ability comes from a creation of internal chain-like structures within them due to dipole-dipole interactions of the dispersed particles leading to a change from nearly Newtonian to Bingham-like behaviour. Thus, the electrorheological fluids can undergo a transition from liquid-like to a solid-like state changing their viscosity significantly. After a removal of an external electric field, the internal structures can be easily destroyed, which causes suspension viscosity reduction again and thus allows external control of rheological parameters. Such behaviour is highly demanding in many industrial fields, such as hydraulics and robotics, where these fluids are used as dampers, vibration controllers, or a medium for various clutches and valves. Electrorheological fluids are generally two phase systems consisting of electrically polarizable particles dispersed in a non-conducting liquid carrier. The particles can be divided into two groups - organic and inorganic. Recently, attention has been concentrated on the carbonized materials. Materials containing carbon are exposed to high temperatures in an inert atmosphere, which leads to their transition to carbonaceous structure containing some heteroatoms (mostly nitrogen). Such particles exhibit considerable electric and dielectric properties and are therefore a promising material for the use in electrorheological fluids. Other recently introduced materials in electrorheology are oligomers of conducting

polymers. Through doping process, which ensures their conductivity, it is possible to prepare particles with the demanding properties for electrorheological fluids.

Shantanu Ganesh Kulkarni, Ph.D.

Date of defence: 29. 9. 2016

Supervisor: Mgr. Robert Vícha, Ph.D.

Adamantane based multitopic guests and their binding properties

Abstract

Host-guest chemistry is very interesting phenomena in supramolecular chemistry. Inclusion complexes which are formed by non-covalent interactions between suitable hosts and guests have several applications. Formation of polymeric aggregates for drug storage, transport, and releasing is one of the most intriguing area. Properties of such systems, which components are bound together via supramolecular interaction, can be efficiently driven by chemical signals. Because of high application potential in pharmacology and/or medicine, new multitopic guest are needed for designing and formation of complex supramolecular systems. Seven new multitopic guests including two tritopic and five ditopic guests were prepared and studied. The main reason to make these guests was to study the ability of these compounds to form inclusion complexes with hosts such as cyclodextrins and cucurbiturils. In order to make these compounds, several synthetic approaches were used. The tritopic guest compounds were prepared in satisfactory yield by coupling 1,3,5-tris(bromomethyl)benzene with 1-(1-adamantylmethyl)-1H-benzo[d]imidazole and 1-(1-adamantylmethyl)-1Himidazole, respectively. Ditopic guests were prepared by Wittig reaction of corresponding aldehydes with imidazole/benzimidazole substituent and benzimidazolium/imidazolium phosphorous ylides followed by quaternization with different alkyl halides. These guests were studied for their binding ability towards cucurbiturils and cyclodextrins. Two tritopic guests were able to form 1:3 inclusion complexes with Beta-CD and CB[7]. They also formed ternary aggregates with Beta-CD and CB[7] in ratios 1:1:2 and 1:2:1. The two families of ditopic guests were prepared differing in central part of the guest molecules. The first family was derived from 4,4'-disubstituted stilbene whereas the molecules of guests from the second family contained a 4,4'-disubstituted diphenylacetylene centerpiece. The stilbene guest with terminal methyl substituents 20 was obtained

as (E)/(Z) isomeric mixture. It was separated into (E)-20 and (Z)-20 isomers by using their significantly different solubility in MeOH:CHCl3 system. The geometry of the (Z)-20 was confirmed by X-ray diffraction analysis. Binding study of ditopic guest molecule (Z)-20 with Beta-CD showed inclusion of the guest in the Beta-CD cavity in such a way that the stilbene centerpiece is positioned inside the Beta-CD cavity and two benzimidazolium moieties occupy the opposite cyclodextrin portals. This complex displayed slow exchange mode on the NMR timescale. The positioning of one benzimidazolium core in the narrow Beta-CD caused locking of the rotation of the half of the molecule while the second half remained free in its rotating being positioned in the wider Beta-CD rim. The guests with diphenylacetylene centerpiece showed poor solubility but still two of the guests were studied for their binding ability. Finally, the complex of Beta-CD with the guest with terminal methyl substituents showed switching of the exchange mode from slow to fast in response to addition of non-polar solvents. The most important and interesting result was, that the influence of MeOH, DMSO, and AcMe was significantly different. Namely, MeOH did not influence the mode of the exchange whereas other two solvents did. These interesting results justify further research on the new presented guests. Particularly, the behaviour in the complex supramolecular systems consisting of polymeric components will be studied.

Ing. et Ing. **Kateřina Sulovská**, Ph.D.

Date of defence: 20. 5. 2016

Supervisor: doc. Ing. Marián Lehocký, Ph.D.

Preparation and Characterization of Antibacterial Surfaces

Abstract

Submitted doctoral thesis is dealing with a preparation of active antibacterial surfaces based on a low-density polyethylene pre-processed in a low-temperature plasma. Such prearranged material were exposed to selected functionalization monomers' vapours and consequently immersed into prepared solutions of antibacterial agents that were evaluated as most effective in previous testing, and which are commonly used in the commercial praxis at the same time. Efficacy of these antibacterial materials was studied by chosen methods, e.g. the FTIR spectroscopy, the scanning electron microscopy or the terahertz spectroscopy belonging to newer experimental methods for material study, with advantage

in intermolecular forces detection. The antibacterial effect and its activity was verified by the agar diffusion test (standardized method), which is considered to be same effective as the dilution method while meeting the conditions during preparation; all materials were tested on representative of gram positive and negative bacterial strains. Results of our experiments showed that materials with antibacterial compounds chlorhexidine and triclosan embody efficiency against selected bacterial strains growth, while materials containing heparin and fucoidan did not prove its effectivity.

Degree Programme: CHEMISTRY AND MATERIALS TECHNOLOGY

Degree Course: Chemistry and materials technology

Antonio Di Martino, Ph.D.

Date of defence: 26. 8. 2016

Supervisor: doc. Ing. Vladimír Sedlařík, Ph.D.

Polymeric nanoparticles for incapsulation and controlled release of bioacive compounds

Abstract

This doctoral thesis is aimed at development and characterization of novel materials for encapsulation and subsequent controlled release kinetics of the model compounds and cytostatic, with focus on nanoparticle amphiphilic systems based on chitosan. This polysaccharide was modified with polylactide. Description of the effect of polylactide structural characteristics on resultant behaviour of the prepared nanoparticle systems represents an important part of the thesis. Moreover, simultaneous encapsulation and release trend of two individual cytostatic were described.

Ing. **Gabriela Jandíková**, Ph.D.

Date of defence: 26. 8. 2016

Supervisor: doc. Ing. Vladimír Sedlařík, Ph.D.

Tailoring of polylactide properties and its degradation behaviour through various modification approaches

Abstract

Tailoring of the material properties and degradation behaviour of polylactide based polyesters through their modifications with specific compounds or the addition of the specific fillers were objectives of this work. The theoretical part brings state of art in the field of environmentally degradable polymers, degradation mechanisms and methodology of the biodegradation testing. Experimental part aims at three approaches for polylactide degradation behaviour through its modification with anti-hydrolysis agent, surface chemically treated natural fibres and hybrid fillers. The novel method for polylactide degradation process characterization by using dielectric relaxation spectroscopy was also tested and optimized within the experimental part.

Degree Programme: FOOD CHEMISTRY AND TECHNOLOGY

Degree Course: Food Technology

Ing. **Ludmila Machů**, Ph.D.

Date of defence: 4. 10. 2016

Supervisor: doc. Ing. Miroslav Fišera, CSc.

Optimization of Methods of Digestibility Determination of Marine and Freshwater Algae

Abstract

Dissertation thesis is focused on seaweed and freshwater algae digestibility determination by enzymatic-gravimetric in vitro method, and determination of selected factors which are able to influence digestibility values. Namely, study deals with determination of dried matter digestibility, organic matter digestibility, nitrogen compounds digestibility coefficient and digestibility of selected elements. Simultaneously, the effect of diverse hydrolysis time and hydrolysis agents on digestibility values is statistically evaluated. Content of polyphenolic compounds and dietary fibre including pectic compounds is also a topic of this

study just as the content of selected factors influencing digestibility values. Last but not least, this study contains set amounts of dried matter, ash, nitrogen compounds and selected elements as a inseparable part of subsequent analyses and calculations. Products available on Czech market from freshwater algae and cyanobacterium (Spirulina - cyanobacterium Spirulina platensis, Chlorella - alga Chlorella pyrenoidosa), red seaweed (Dulse - Palmaria palmata, Nori - Porphyra tenera) and brown seaweed (Arame - Eisenia bicyclis, Hijiki - Hizikia fusiformis, Kombu - Laminaria japonica, Wakame a Wakame instant - Undaria pinnatifida) were chosen for the investigation purpose. Based on provided analyses, it was investigated that digestibility values of freshwater algae and seaweed in general are high and also dependent on the length of enzymatic hydrolysis, on the type of chosen hydrolysis agent and on the concentration of compounds influencing digestibility values. In all algal food products, a high amount of polyphenolic compounds and dietary fibre including pectic compounds was investigated. Moreover, statistic evaluation by way of correlation has proved that concentration of these compounds affects digestibility of seaweed and freshwater algae.

Ing. Mgr. **Silvie Pavlíčková**, Ph.D.

Date of defence: 4. 10. 2016

Supervisor: doc. MVDr. Ivan Holko, Ph.D.

Characterization of Escherichia coli strains isolated from food

Abstract

The doctoral thesis focuses on bacterium Escherichia coli in food. The PhD thesis deals with the characterization using phenotypic and genotypic methods. Escherichia coli is found in various kinds of food, especially in food of animal origin. Currently, resistance to antimicrobial agents is a worldwide problem because of a large increasing of resistant bacteria of humans and animals. To determine the prevalence of resistant E. coli strains from foodstuffs, antibiotics sensitivity testing to selected antibiotics by discs diffusion method has been carried out. Furthermore, it has been tested the presence of resistance genes by the PCR method, especially to beta-lactam antibiotics. Since E. coli belongs among potentially pathogenic microorganisms, another objective of characterization was to determined selected virulence factors using classical and multiplex PCR. Classification of strains into

phylogenetic groups by triplex PCR also contributed to determine the pathogenic potential of isolates. Another part of characterization was to found out the production of bacteriocins with subsequent genotyping by PCR to determine the exact type of colicin or microcin. Finally, it was determined biofilm formation ability by spectrofotometrically measuring of absorbance in microtiter plates. All these results bring new insights about virulence and antibiotic resistance in E. coli strains isolated from food and contribute to a deeper understanding about physiological characteristics of this bacterium. Based on the obtained results was evaluated importance and potential dangers of the occurrence of E. coli in food and environment.

Ing. Mgr. **Jarmila Vávra Ambrožová**, Ph.D.

Date of defence: 4. 10. 2016

Supervisor: doc. Ing. Miroslav Fišera, CSc.

Bioactive compounds of marine and freshwater algae

Abstract

Searching for alternative sources of nourishment for the human population as well as for livestock is a topical issue and algae appear to be a very promising one. Nowadays, algae are referred to as functional foods. This means that not only did they perform nutritional value of selected substances, but also have beneficial health effects. However, it is necessary to determine whether commercially available products made from algae contain a sufficient quantity of selected biologically active agents compared with fresh algae. Ph.D. thesis deals with determination of selected biologically active substances of freshwater and marine algae to clarify their chemical composition. After analyzes being performed, appropriate species of freshwater and marine algae will be selected according to their potential use in the food industry.

Degree Programme: PROCESS ENGINEERING

Degree Course: Tools and Processes

Ing. **Jiří Čop**, Ph.D.

Date of defence: 29. 6. 2016

Supervisor: doc. Dr. Ing. Vladimír Pata

The influence of technological conditions on the surface quality of tool and polymer products

Abstract

Price of the injection mould is reflected in the cost of tool material as well as cost of its own production. Therefore, shortage of production cost and production time of injection mould is highly demanded. Very precise finishing operations like lapping or polishing have become an important part of the production of cavities, bearing surface, runner systems and other systems of injection mold. However, these finishing operations can take more than half of total production time in the manufacturing of injection mould, and that is significantly reflected into the price of it. In practice, the cavities are very often lapped and subsequently polished to obtain high surface quality of injection polymer parts in terms of aesthetic view (high shine) or surface roughness. Nevertheless, in case of some processed polymer materials, the high surface quality and shine of polymer product is impossible to be achieved. Moreover, on the world market a lot of injected polymer products do not have to reach the highest surface quality, because their surface does not perform any function. Therefore, it is very important to consider the benefits of expensive finishing operations, which increase not only the cost of injection molds but also the cost of products. This dissertation thesis is focused not only on appropriate use of finishing operations in production of cavities but also on number of influences which can strongly affect the surface structure of injected polymer parts and its cost as well. Proper setting of injection molding technological conditions is highly important. Inappropriate choice of these conditions can lead to production of dimensionally inconvenient polymer parts, to insufficient mechanical resistance or decrease of surface quality of the products. Except the above mentioned properties, mould parts can be also affected by choice of polymer materials and theirs properties like viscosity or the size of crystalline phase. Last but not least, the inconsiderable impact on the price of mould and properties of product has the proper choice of tool materials

especially for cavities. Different tool materials of cavities represents for injected products various cooling rate of polymer melt, because of their diverse thermal conductivity. Therefore, the main aim of this thesis is to determine the degree of influence of technological conditions (injection pressure, holding pressure and injection speed), melt flow rate of polymer (viscosity of the polymer melt), supramolecular structure of polymer (amorphous and semicrystalline) and finally the material of cavities on the surface roughness parameter Ra and Rz of the injection molded parts.

Ing. **Ladislav Fojtl**, Ph.D.

Date of defence: 29. 6. 2016

Supervisor: doc. Ing. Soňa Rusnáková, Ph.D.

The influence of material composition and shape on selected physical properties of sandwich constructions

Abstract

Sandwich composites are well known for many years and its place among the construction materials have they deserved mainly due to very good mechanical properties related to their weight. These materials have been a subject for many researches, but very few of them were focused on the behavior of curved constructions in bend with respect to their specific shape (curvature). In technical practice, parts created from these composite materials are applied in various exterior and interior applications, where they are formed into shapes given by design of whole assembly or construction. With increasing amount of newly developed materials and from them resulting possible material combinations, it is necessary to characterize the properties of prepared structures and also assess the effect of shape on sandwich constructions behavior with respect to their material composition. This dissertation thesis is focused on the research of flat and curved sandwich constructions that by its material composition corresponds to those used in public and rail transport. For the purpose of the experiment, laminate mold enabling the production of two types of curved sandwich panels was designed and manufactured. Sandwich beams, created from cured panels, were tested in three-point and four-point bending in different variants of sample clamping. Measurement itself was conducted at three different operational temperatures; negative, ambient and increased temperature. Specifically, the influence of curvature and

other possible effects on values of the effective modulus and flexural load capacity was evaluated in all experiments. At the beginning of the main results description, individual types of produced flat sandwich structures are compared with respect to the core dimensions (thickness) and also according to various operational temperatures. The influence of shape, namely curvature, was assessed for individual material composition separately according to core thickness. Based on experimental testing, it was found that especially greater curvature ration of concavely clamped beams reduces the values of effective modulus of elasticity. Flexural load capacity was significantly affected by the curvature, but the extent of impact for concave and convex clamped sandwich beams varied according to the core material. The values of both tested parameters, obtained at various configurations of bending test varied between themselves, but trends of decrease or growth remained almost unchanged. Differences were identified only for sandwich structures with a honeycomb core. Research of the effect of temperature on the behavior of curved sandwich structures brought interesting results especially for more curved beams with 10 mm cores at an elevated temperature, where the shape positively influenced by increase of load capacity in comparison to the flat beams in all tested series. Moreover, failure modes were also observed during all experimental measurements. Furthermore, peel tests for cohesion characterization of the sandwich structure individual parts were also performed. DMA analysis was conducted as well to characterize the influence of temperature on the properties of individual materials constituting the sandwich constructions. At the end of this thesis, diagrams of model dependences of effective flexural modulus, flexural stiffness and strength of resulting sandwich structure according to the elasticity modulus of the core are constructed and described. These diagrams are created for different number of prepreg layers in face sheets and the comparison of results from FEM model, analytic calculations and experimental values is also given in corresponding diagram.

Ing. **Vojtěch Šenkeřík**, Ph.D.

Date of defence: 13. 9. 2016

Supervisor: Ing. Michal Staněk, Ph.D.

Influence of recycled material preparation to properties of product

Abstract

The main aim of this dissertation is to show that powerful optimizing tools like evolutionary algorithms can be in reality used for the optimization of deterministic chaos control. This work is aimed on explanation of how to use evolutionary algorithms (EAs) and how to properly define the cost function (CF). It is also focused on selection of control method and, the explanation of all possible problems with optimization which comes together in such a difficult task, which is chaos control. Firstly, the most common and used chaos control methods are described - Linearization of Poincaré Map (OGY method), Time - Delayed Feedback (Pyragas method). The next part is focused on the description of the most known examples of chaotic systems, discrete - time systems (Logistic equation, Henon map); and also briefly is focused on time - continuous systems (Lorenz system, Rossler system). The following and the biggest part describes the results of optimization of chaos control. It consists of seven case studies and each one is aimed on testing the proposal of cost function used for optimizations within this case study. This work deals with an investigation on the optimization of the control of chaos by means of EA and constructing of the cost function securing the improvement of system behavior and faster stabilization to desired periodic orbits. The control law is based on two Pyragas methods: Delay feedback control - TDAS and Extended delay feedback control - ETDAS. As models of deterministic chaotic systems, one dimensional Logistic equation and two dimensional Henon map were used. The evolutionary algorithm SOMA (Self-Organizing Migrating Algorithm) was used in four versions and Differential Evolution (DE) in six versions. For each version, simulations were repeated several times to show and check robustness of used method. At the end of this work, the results of optimized chaos control for each case study are compared and also the comparison with classical control technique - OGY is also presented. From the obtained results, it is possible to say that all simulations gave satisfactory results and thus evolutionary algorithms are capable of solving this class of difficult problems and the quality of results does not depend only on the problem being solved, but they are extremely sensitive on the proper definition of the CF, selection of control method or parameter settings of evolutionary algorithms.

Ing. **Adam Škrobák**, Ph.D.

Date of defence: 28. 6. 2016

Supervisor: Ing. Michal Staněk, Ph.D.

The Influence of the Production Process on Mechanical Properties of Rubber Testing Samples

Abstract

The dissertation deals with the impact of the technological procedure on physical properties of rubber testing samples. The objective of the thesis was to find out to what extent the mechanical and dynamic properties of samples which are produced by the standard preparation technology, i.e. cutting out of a compression molded plate, and samples produced by injection molding differ. The third way of sample preparation was cutting out of an injection molded plate. Another objective of the dissertation was to record the impact of the time of curing on the observed properties. A necessary condition of this experiment was designing and producing a universal injection mold for injection molding of the testing samples and the plate. For the purpose of this research two industrially used rubber-making compounds appointed for injection molding of products were used. One compound was on the basis of India and butadiene rubber and the other one on the basis of ethylene-propylene-diene rubber. The produced samples were then put to the tensile test, graves, crescent and trouser tear test, hardness test Shore and dynamic mechanical analysis. Last but not least the samples were put to the test of swelling in methylbenzene to assess the degree of cross-linking. The results of the tensile test indicated that the standard method of testing samples preparation can also be used for compounds appointed for the production of injected products. However, it is not wholly objective, especially when testing the structure properties. Moreover, it was discovered that the method of filling has an impact on inner arrangement of the vulcanizate macromolecules, namely also after cross-linking. On the results of this dissertation it is recommended, in case of producing rubber products by injection molding, to test structure properties by using testing samples also produced by injection molding.

1.2 Faculty of Management and Economics

Degree Programme: ECONOMICS AND MANAGEMENT

Degree Course: Management and Economics

Ing. **Pavel Grebeníček**, Ph.D.

Date of defence: 23. 3. 2016

Supervisor: prof. RNDr. René Wokoun, CSc.

Support of Business and Innovations in Strategic Planning of Regional Development

Abstract

The dissertation deals with the issues of business and innovations support in the context of strategic planning of the regional development. The main objective of the dissertation is to propose a methodology for the evaluation of the business and innovations support within the frame of the strategic planning of the regional development. Special attention is devoted to links between the planning and budget process of planning entities. The methodology of the dissertation is verified for the regional level conditions of the Czech Republic. The dissertation will contribute to the theoretical elaboration of the above mentioned issues, and also to improve the practical process used in the strategic planning of the regional development in the Czech public administration at the regional level.

Ing. **Petr Krenar**, Ph.D.

Date of defence: 23. 3. 2016

Supervisor: prof. Ing. Ján Porvazník, CSc.

The Key Attributes of Success of Managerial Teams in Multinational Companies operating in the Czech Business Environment

Abstract

The doctoral thesis highlights the importance of issue as a team and teamwork in the environment of multicultural organizations, particularly the author's focus on the key attributes of managerial teams' success in multinational corporations operating in the Czech business environment. In the introduction, the author explains in detail the reasons for the choice of topic. The thesis is logically organized and divided into several successive parts. The first chapter describes the current state of topic, which among other things, defines the basic

terminology as a team, teamwork and multicultural environment, characteristics for a shaping and a leading of a multicultural team including a defining of the success team, benchmarks for the success evaluation and the factors that have considerable influence on the success achievement. The basic theoretical background ends this chapter. The second chapter provides an objective research. The main aim of the dissertation, based on the field research and knowledge of national and international literature concerning management of teams, is to identify the key attributes affecting the success of management teams in the multinational companies, operating in the Czech Republic, and to propose the model which should enhance their success in terms of the Czech business environment. It goes on to formulate the four basic research questions, and briefly describes the methods of scientific work and applied research methodology, particularly statistical methods and empirical data collection methods. The following chapter contains the main results of work that were emerged from interviews and questionnaire survey among the managers including the verification of basic research questions; the obtained conclusions have been generalized. On their basis there was proposed the model of six determinants (the crucial driving forces), which should enhance and make a managerial teams success stronger in terms of multinational companies operating in the Czech business environment. The last chapter lists the benefits of this work for science and practice.

Ing. Bc. **Ivana Pejřová**, Ph.D.

Date of defence: 1. 11. 2016

Supervisor: doc. PhDr. Ing. Aleš Gregar, CSc.

Knowledge Management of Workers Ages 50

Abstract

Topic of the thesis is knowledge management of workers over 50. The main aim is to propose specific procedures of knowledge management, as a part of personnel management of older workers, focusing on retention, appreciation and development of human capital. Within achieving this aim, relationship between knowledge management and human resource management is specified, older workers are identified as possessors of key knowledge and skills within organization (human capital), and specific procedures in work organization, motivation and qualification development are proposed so that the human capi-

tal is retained, appreciated and developed. At the beginning, the author gives the reasons for choosing the topic. The next chapter describes the current state of theoretical knowledge of the solved topic as well as provides the theoretical basis of the thesis, its conceptual framework and methodological procedure of work. Thesis's aims, research questions and hypotheses are defined in the third chapter. The fourth chapter presents the methodology and research project. The fifth chapter is devoted to analysis of data together with the validation of hypotheses. The sixth chapter continues with interpretation and discussion of results, including the limits of research findings. The final chapter provides benefits of thesis for theory and practice together with pointing out the next possible continuation of the research work.

Ing. **Lenka Smékalová**, Ph.D.

Date of defence: 23. 3. 2016

Supervisor: prof. RNDr. René Wokoun, CSc.

Implementation of the European Union Cohesion Policy in the Czech and Slovak Republic

Abstract

Cohesion policy presently embodies an important financial source aimed at the area of regional development. Its implementation in the 2007 - 2013 period is the focus of the thesis. The main objective is to classify the admin-istrative regions of researched countries from the point of view of their rela-tive development characteristics and the actually sum if support from the European Union cohesion policy. To achieve this objective an analysis of each Convergence operational programme on a project level was made. This analysis also indicated how well the goal of the national governments of the Czech and Slovak Republic to support specific regions was pursued. To provide answers to the abovementioned the methods of literature review, cartographic methods as well as the descriptive and inferential statistics were used. The classification of regions resulting from cluster analysis indicates the same types of regions exist in both countries. At the same time the results imply diversion form the intervention logic of the cohesion policy which is the support of the most underdeveloped regions.

Ing. **Christian Nedu Osakwe**, Ph.D.

Date of defence: 13. 12. 2016

Supervisor: doc. Ing. Miloslava Chovancová, CSc.

A Framework For Embedding A Strong Brand-Oriented Culture And Its Implications For Enterprises: African And European MSMEs' Evidence

Abstract

The brand phenomenon, or simply brand building, amongst other interventions for the private firm, is well-recognized for the valuable role it plays in today's market competition. Research has, however, shown that for the firm ranging from micro to small- to medium-size enterprise (MSME), their business owner-managers often tend to grossly underestimate the power of building a strong brand name in the marketplace. All this suggests that if the MSME is quite serious about enhancing its capacity to compete profitably in the medium to long-term; among others, it has got to pay considerable attention to (corporate) brand building process in general and in particular that of the development of a strong brand-oriented culture (BOC hereafter) in the first place. The greater argument here is that by embedding a strong BOC, the MSME stands a better chance to not only stay reasonably competitive, increase its revenue streams, increase its visibility in the marketplace, but that it will also increase its chances of survival in the event of any economic downturns. Long story short, in this scientific work, the researcher is particularly interested in the identification of the key underlying dimensions of a strong BOC, as well as the validation of its driving factors in the firm; plus the fact that the research also seeks to understand better the implications of the composite BOC construct to the firm. It is this reasoning that has largely informed and triggered the work. Put more clearly, the research objective is to create and validate a conceptual framework, which seeks to deconstruct the relevance of the notion of a BOC to the firm by firstly highlighting its critical underlying dimensions, and secondly uncovering its critical enabling factors, and more fundamentally its overall implications for the MSME. In doing so, the thesis draws upon an array of literature on strategy research in general and branding stream of research in particular. The resource-based theory (RBT) is framed as the theoretical underpinning of this work, as it has been conceived that brand should be treated as a strategic resource of the firm. And to further achieve the objective of the study, primary data were collected from firms in two developing economies and on two continents (i.e., Macedonia on the European front and Nigeria on the Af-

rican front). The Partial Least Squares Structural Equation Modeling was employed to empirically test and validate the research hypotheses. In addition to the rich findings of the research, one of the big takeaways from the thesis comes from the framing of a conceptual toolkit (see Figure 2), which primarily should serve as a useful guide for the MSME and in the hopes that it will practically help the operators to have a solid understanding about the core requirements for a strong enterprise-wide BOC, which in turn helps advance the competitiveness and economic prosperity of the MSME. It is worth mentioning that the contributions to theoretical knowledge, managerial practice, and policymaking are highlighted in the penultimate section of the thesis. Limitations of the research as well as useful suggestions for further research have equally been highlighted (see the concluding section of this scholarly piece of work for more information).

Degree Programme: ECONOMIC POLICY AND ADMINISTRATION

Degree Course: Finance

Ing. **Roman Hlawiczka**, Ph.D.

Date of defence: 30. 3. 2016

Supervisor: doc. Ing. Marie Paseková, Ph.D.

Credit risk management of SME in commercial bank

Abstract

The main goal of the thesis was to design innovative model of the credit process of commercial banks in relation to the SME segment. The dissertation examines the important context of the credit process in relation to the SME segment and the possibility of its improvement in the context of the potential growth of the commercial bank financial performance and economic growth of SME. The credit risk management process of small and medium-sized enterprises is analysed and the own methodology of formation of internal rating model is presented based on the selected mathematical-statistical methods and tested for the quality of internal rating model tested. There is presented an innovated complex methodology of the credit process in the segment of SME.

Ing. **Anna Chocholáková**, Ph.D.

Date of defence: 30. 3. 2016

Supervisor: prof. Ing. Jaroslav Belás, Ph.D.

Model of the purchasing preferences dependence upon bank customers' loyalty

Abstract

Research problem solved within the dissertation is the impact of satisfaction and loyalty of the banking customer on the financial performance of commercial banks. The main objective is to propose a customer care system for retail clients in a commercial bank in the context of prospective growth of bank's financial performance. To achieve this objective, qualitative and quantitative research techniques were used to analyze critical literary research and a questionnaire survey on the satisfaction and loyalty of banking customers. The obtained data were processed using mathematical and statistical analysis.

Ing. Mgr. **Peter Ondrčka**, Ph.D.

Date of defence: 30. 3. 2016

Supervisor: doc. Ing. Miloš Kráľ, CSc.

Optimizing the profit of the securities portfolio from a tax perspective

Abstract

A theory on how investors can construct portfolios to optimize or maximize expected return based on a given level of market risk, emphasizing that risk is an inherent part of a higher reward. Research in investment decisions and how this will change in relation to the new legislative rules and prolonging of the non-taxation period from 6 months to 3 years. This topic is relatively new and it has not been analyzed before and is the first one on Web of science and Scopus. The main goal of the work is to build a methodological conception of construction portfolio selection models. To achieve main aim methods of qualitative research such as fundamental analysis as well as mathematical or statistical methods were used, also questionnaires pointed towards specified topic were used. Finally, the method of

synthesis proved that solution provided within this work is applicable, usable in practice for financial investment and also useful for pedagogical community, i.e. education of this methodology on economical universities. In the theoretical part of this work a critical structure of theoretical approaches from the area of modern theories of portfolios with accent to maximalisation of capital revenue, and also tax legislature is provided. On an example of model portfolios two most suitable strategies were used in order to maximize portfolio revenues (in the first place mainly the method of creating a dividend yield). The analysis and case studies within the work have proven that prolonging the time limit from 6 months to 3 years for none tax rate on revenues from capital yields while using the dividend yield: Can provenly achieve tax savings and by this raise the net income from financial investment in comparison to revenue achieved before taxation. Hot this change changes the creation and revenue of financial portfolio. In the period of testing there was no change in the behavior of the investors (probably due to the cause of the short-term appliance of legislature change). As explained above, these results are widely applicable in the financial controlling of companies as well as individuals who invest on financial markets. They are applicable in pedagogical process on economical universities.

1.3 Faculty of Multimedia Communications

Degree Programme: VISUAL ARTS

Degree Course: Multimedia and Design

Mgr. **Lucia Fišerová**, Ph.D.

Date of defence: 26. 6. 2016

Supervisor: doc. MgA. Jaroslav Prokop

My Culture. The Slovak New Wave in Photography of the 1980s

Abstract

The dissertation My Culture. The Slovak New Wave in Photography of the 1980s aims to examine photographic works of eight authors, who come from Slovakia and studied on Prague Department of Photography FAMU during the 1980s. When choosing the oldest

period of their works, which corresponds to time of their studies and first years after graduation, I was motivated by a conviction about an intensive accumulation of the period energy on this "island of liberty". The Department of Photography became a ground for creative ideas going beyond limits (genre, formal and intellectual) of Czechoslovak art photography, which nobody had questioned until then. My aim in the dissertation is to reappraise existing theoretical viewpoints which are connected with works of the authors and which result primarily from art-historical positions. My research aims to take a wider spectrum of questions, related to the problem and clarifying the photographic works themselves, into account. I thus for instance focus on institutional background (FAMU, system of teaching, influence of pedagogical personalities, galleries, strategies of exhibitions, field and position of a curator,?), national question (definition of "Slovakness" in art and in photography, existence or non-existence of "Czechoslovak photography", suitability and aptness of the term,?), situation in Czechoslovak art photography and mainly in the field of nude photography (general suspicion of accepting an image of a naked human body, a blasé image of a nude in the 1970s and 80s and a subsequent questioning of the term nude itself by an interconnection of a body with an object or a real environment). The fact that some theorists tend to interpret works of the authors as the first demonstrations of photographic postmodernism in our country has also become an interesting issue to consider. In my research, I point to an unconscious presence of a contrary, modernistic model, which lies mainly in traditional, gender conditioned views which the photographers use to look at a female body. The information, gained and confirmed in the first, theoretical-historical part of the thesis, is subsequently applied in the second, analytical-interpretative part. Analyses of many particular photographs are assorted in eight chapters according to related motives. I personally consider the part where the question of portraying a naked body is analysed in detail (within five chapters) the most significant. I link traditional common terms (nude, irony, eroticism, unbinding games,?) with terms like melancholy, pain, pleasure, confined feeling from a body in space, symbolism of a body, gaze, dominant masculinity and so on.

Mgr. **Zuzana Kupková**, PhD.

Date of defence: 22. 6. 2016
Supervisor: prof. Peter Štarchoň, Ph.D.

Ways of Using Graphic Design in Brand Building and Brand Management

Abstract

The dissertation thesis Ways of using graphic design in brand building and brand management is dealing with the different point of view of par ticipants at the process of creating of corporate design. The aim of the thesis is to analyse the process and to research conflicts between marke-ting specialists and graphic designers appearing during their cooperation. According to findings of the research the model of process of creating visual style will be defined and a list of recommendations for better coo-peration too. Another part of the research will be analysis of study plans at universities in the Czech Republic offering marketing or graphic design programmes, including both public and private universities. The target of the study is to find out how these experts are educated to un-derstand the other branch ? whether the graphic designers are taught marketing and vice versa. Both analysis results will be a basis for setting of recommendations for possible changes in education.

Mgr. **Tomáš Šula**, Ph.D.

Date of defence: 5. 12. 2016

Supervisor: prof. Peter Štarchoň, Ph.D.

The use of graphic and industrial design in the creation of ambient media and their application to marketing communications

Abstract

The aim of the thesis is to show and define the relationship between graphic, product design and a message communicated via ambient media. The thesis also describes the efficiency of delivering message to the recipients. All the theoretical statements are supported by primary research among global public, which consumes both commercial and non-commercial messages. This sample could be considered as primary target group for creation of ambient media. Another resources include available theoretical thesis, books, publications which will be also categorized. Segmentation of ambient media will be set with help of qualitative research and experiment.

1.4 Faculty of Applied Informatics

Degree Programme: ENGINEERING INFORMATICS

Degree Course: Automatic Control and Informatics

Ing. **Tomáš Barot**, Ph.D.

Date of defence: 10. 11. 2016

Supervisor: doc. Ing. Marek Kubalčík, Ph.D.

Predictive Control of Processes with Fast Dynamics

Abstract

Predictive control is a control method, which is appropriate for control of various kinds of processes. In certain cases of predictive control of fast? dynamics processes, a predictive control algorithm may not be feasible within the sampling?period time. These situations occur when requirements on control are more complex. For higher horizons and many constraints on control variables or in multivariable control, the overloading of the sampling period can occur. In the thesis, the current state of art is researched in the area of predictive control of fast?dynamics processes. The established approaches are focused primarily on the quadratic programming and its influence on the predictive control. These solutions are based on the duality theory, Kuhn?Tucker conditions and operations with constraints in the algorithm of the predictive control. Aim of this thesis is an innovation of these approaches with respect to a decreasing of their computational complexity. Presented approaches are based on the more detailed elimination of constraints in the quadratic programming. The new modified dual optimization method is designed. The proposed approaches are implemented for the SISO and TITO processes in the software for MATLAB. The main results are verified and compared to the established methods with respect to ability of predictive control of fast?dynamics processes in the defined sampling period time.

Degree Programme: ENGINEERING INFORMATICS

Degree Course: Engineering Informatics

Ing. **Eric Afful-Dadzie**, Ph.D.

Date of defence: 21. 1. 2016

Supervisor: doc. Mgr. Roman Jašek, Ph.D.

Research of Possibilities of Using Mouse-like Input Devices as a Biometric Identification System

Abstract

Research into identifying people according to how they use mouse-like input devices, has so far only weakly explored presumptions of the methods used--for example environmental influences or influences of the source of original data. According to the author's knowledge, no work has yet tried to reproduce or enhance some predecessor's work. The results of existing works are promising, but only loosely connected. In order to improve the above-mentioned situation, this doctoral thesis reviews existing works in the field, provides theoretical foundations to better understand and further evolve this identication method, and also explores modifications in feature selection algorithm. Based on this theoretical summary, the experimental part of this dissertation focuses on improving feature selection and on comparing three different user environments and their data. It also enhanced selected former research on the use of unrestricted movements. Experiments designed by the author are carried out and their results are discussed for each mentioned experimental part.

Ing. **Petr Lukašík**, PhD.

Date of defence: 5. 9. 2016

Supervisor: doc. Ing. Martin Sysel, Ph.D.

Use of parallel computations and Grid computing technology for large-scale scientific computing

Abstract

The article focuses on the problem of usage a grid computing as a tool for optimizing the load of the master server that is deployed in planning and production control. The motivation for the use of the grid is a known fact of the uneven load of the master server and the workstations. Problem is solved so that some algorithms of the Enterprise Rresource Planning (ERP) system are distributed to the end-user workstations. The improvement was mainly achieved by that the system batch jobs has been replaced as the event-driven distribution of objects, which solves some of the standard tasks of the planning process on the user´s workstation. The result was optimal load distribution of the server in a time. Another objective was to investigate and propose solutions to use the methodology of parallel algorithms for solving problems of distributed computing and grid technology. Keywords: Intranet Grid, Optimizing the computing load, Scheduling , JSDL, Distributed computing, Parallel computing, Checkpointing, Fault Tolerant System 5.

Ing. **Michal Pluháček**, PhD.

Date of defence: 21. 1. 2016

Supervisor: prof. Ing. Ivan Zelinka, Ph.D.

Modern methods of development and modification of evolutionary computational techniques

Abstract

The main aim of this work is to show that it is possible to improve the performance of evolutionary computational techniques for single-objective continuous optimization problems by various modification methods. It is shown that by relatively simple modifications it is possible to improve the performance of Particle swam optimization algorithm on both artificial benchmark functions and real-world problems. Firstly it is introduced the importance of optimization and the basic principles of evolutionary optimization. Further the modern trends in modification of evolutionary computational techniques are introduced alongside with the areas of application for these methods. Also the thesis focus on Swarm intelligence representative Particle swarm optimization algorithm is explained. Further the basics of swarm intelligence are described alongside with notable representatives of this category of evolutionary techniques. The Particle Swarm optimization algorithm that has been used in this work is described in detail. Used benchmarks are also described. As a significant part

of the research dealt with using of pseudo-random number generators based on chaotic systems, the theoretical part concludes with detailed description of used chaotic systems including equations and plots. In the experimental part the results of long-term research are presented. Firstly the Chaos PSO is described in detail. The implementation of chaotic sequences as pseudo-random number generators is explained and the performance and behavior of PSO algorithm driven by chaotic pseudo-random number generator is investigated in detail. Further a tuning experiment is presented. The first part concludes with an example application of the chaos driven PSO algorithm on a model task of PID controller design. In the next section it is presented the multi-chaotic approach for chaos driven PSO - promising method developed during this work. In this approach multiple chaotic pseudo-random number generators are used within one run of the algorithm and enhance its performance by changing the behavior of the swarm in a desirable way. It is also shown the utilization of this approach for another evolutionary computational technique ? the Differential evolution algorithm. During the research of chaos driven PSO the inner dynamics of the PSO algorithm were studied in detail. As a reaction several modifications of PSO algorithm were proposed and tested. As first the Multiple-choice strategy for PSO is described. In this design a heterogeneous swarm is created and the roles are randomly assigned. As a second example of successful PSO modification the newly developed Gathering algorithm is presented. In the Gathering algorithm the phenomenon known in literature as ?snowball effect? is used to highlight the promising regions by gathering of multiple particles and avoid the problems common for algorithm with static attraction points. The performance of all above mentioned algorithms was tested using common benchmark functions and the results are compared either with canonical PSO algorithm or state-of-art representatives. The research results were continuously published and presented in international conferences with great reception. Based on results obtained during this research is possible to claim that the performance of evolutionary computation techniques can be improved by various modern methods such as chaotic sequence implementation or inner principles modifications.

Ing. **Dalibor Slovák**, Ph.D.

Date of defence: 14. 12. 2016
Supervisor: prof. Ing. Vladimír Vašek, CSc.

Signal Frequency and Amplitude Analysis - The Identification of Short-term Impulse-related Damage In Audio Files

Abstract

This dissertation is concerned with the identification of short-term pulse damage to audio-data (i.e. recordings). Its aim is to identify short-term impulse damage - which is a (highly) undesirable part of the processed audio-data; and, in the context of future developments - that are not part of this dissertation, to elaborate possibilities related to how to eliminate this undesirable short-term pulse damage. The resulting software application (i.e. a set of software interfaces) will analyse audio-data by means of multiple identification methods in a way that - hopefully, will be almost unquestionable; and, vice versa, will confirm the assumption that the analyzed audio files incorporate short-term pulse damage. The application is intended as an initial (default) starting-point for supporting software analysis tools for audio (phonographical) professionals and Czech Radio sound-studio experts. It should also serve as a support tool for controlling such audio-data - prepared on the basis of the programming requirements of other departments of the Czech Radio broadcasting stations. This dissertation is a component of the cooperation between the Department of Computer and Communication Systems at the Faculty of Applied Informatics, Tomas Bata University in Zlin, and the Czech Radio Sound Archive, based in Prague.

2 DEFENDED HABILITATION THESES

In 2016, 6 habilitation theses were defended: 3 at the Faculty of Technology, 2 at the Faculty of Management and Economics and 1 at the Faculty of Applied Informatics.

2.1 Faculty of Technology

Course: Technology of Macromolecular Compounds

doc. **Marcin Kostrzewa**, Ph.D.

Appointed with effect from: 1st November 2016

Interpenetrating polymer network as a matrix for epoxy nanocomposite

Abstract

Habilitation thesis contains a review of scientific knowledge about interpenetrating polymer networks (IPN), based on epoxy resin, applied as a polymer matrices for nanocomposite preparation.

This research work, in Paper H1 –Paper H4, includes the discussion of author's published scientific papers dealing to the incorporation of nanoclays, preparation of polyurethanes as a second component for IPN formation with epoxy resin. Moreover, Paper 5 – Paper 10 described procedures used in ternary nanocomposite preparation as well as reported the mechanical properties evaluation of obtained nanocomposites. It also enriched by IPN structure and fracture surfaces morphology analyses based on scanning electron microscopy pictures.

Results confirmed that epoxy based IPN systems with a relatively low modifier loading (not exceeding 10%) can be used as very efficient composite matrix, especially in case where specific interaction occur between the components. Moreover, if there were well dispersed organoclay particles within IPN matrix, the formed material exhibited markedly improved thoughness without thermal properties deterioration, when compared to the pure polymer or conventional (microscale) composites.

Based on the obtained results it can be concluded that a combination of epoxy resin and polyurethane can be used to form the nanocomposite matrix with strong grafted interpenetrating polymer network structure which is additionally reinforced by well dispersed and exfoliated montmorillonite nanoplates. The occurrence of the interaction between all used

components is preferred because it leads to achieve the appropriate level of compatibilization.

doc. Ing. **Michal Sedlačík**, Ph.D.

Appointed with effect from: 1st June 20156

Novel Approaches to Design of Intelligent Fluids

Abstract

The habilitation sets out to design new approaches to smart employment of electrorheological fluids and magnetorheological suspensions leading to their broad-er utilisation in engineering.

The first part is devoted to the description of electrorheological fluids and is finished with commented set of works dealing with development of novel die-lectric particles in form of conductive polymers, inorganic and composite parti-cles for effective electrorheological systems. Results in the area can be summa-rised as follows:

- For the first time in the field of electrorheological fluids the utilisation of oligomers of conductive polymers with their conductivity set-up con-trollable in one-step synthesis has been observed
- A positive impact of conductive polymers carbonisation on their electrorheological efficiency has been proved
- Using innovative microwave-assisted synthesis rod-like particles of titani-um dioxide have been prepared and their higher polarisability over spheri-cal particles has been proved
- Substantial enhancement of long-term stability of electrorheological system has been achieved through preparation of hollow spherical structure of inorganic particles coated with conductive polymer (core-shell structure)
- Introduction of polar groups onto the surface of inorganic nanoparticles has led to a considerable polarisation increase and consequently generation of more efficient electrorheological effect

Second part focuses onto general description of magnetorheological suspen-sions and is provided with a commented set of works on the topic of their long-term and oxidation sta-

bility enhancement as well as utilisation of ferrofluids. Results in the area can be concluded as follows:

- Employment of composite particles with core-shell structure has increased not only long-term but also oxidation stability of studied systems
- Successful pioneering of tensiometry in the field of magnetorheological suspensions for long-term stability studies has been employed
- A positive long-term stability impact of magnetic microparticles substituti-on with nanoparticles has been proved for magnetorheological suspensions
- A way of controlling magnetic properties of nanoparticles with the view of their applications have been proved
- A possible application potential of ferrofluids in the form of magnetic me-diated hyperthermia has been presented

Course: Food Technology

doc. Ing. **Jiří Mlček**, Ph.D.

Appointed with effect from: 1st November 2016

Non-traditional garden crops as a source of bioactive substances and their usage in the food industry

Abstract

Requirements of consumers on the food quality, nutritional content and wide range of goods not excluding fruit and vegetable has been increasing. So has the demand for non-traditional, novel species of fruit and vegetable. It concerns locally not well-known species and species pushed aside together with the intensification of agriculture in the last decades. These non-traditional species bring a significant benefit – they perform a valuable source of vitamins, minerals, fibre, enzymes and bioactive substances with anti-oxidative properties mostly of much higher contents than could be found within conventional species of fruit and vegetable. This enables non-traditional species of fruit and vegetable to enter onto the Czech market. They represent an interesting commodity able to meet high consumers' requirements. Other benefits include considerable adaptability, low demands on environmental conditions, wide species diversity and variable ways of processing and usage in the food industry, pharmacy and other industrial sectors.

This habilitation thesis concerns with the study of content substances in non-traditional species of fruit (cornelian cherry (*Cornus mas* L.), European cranberrybush fruit (*Viburnum opulus* L. var. *edule* Marsh.), saskatoon berry (*Amelanchier alnifolia* Nutt.), sea buckthorn (*Hippophaë rhamnoides* L.), honeyberry (*Lonicera caerulea* L. var. *kamtschatica* Pojark.), cape gooseberry (*Physalis peruviana* L.), interspecific Rowan crosses) and in edible flowers.

The thesis provides information about the content of polyphenolic substances, vitamins, minerals, some technological parameters and anti-oxidative activity. These results are significantly important especially with respect to technology of processing, storage, further possibilities of their usage in the food industry and to their health importance. In this thesis, non-traditional species of fruit and vegetable are compared with common species.

The thesis contributes to novel knowledge about non-traditional species of horticultural crops in relation to human diet, suitableness of cultivation and their usage options. It popularizes these species in general.

2.2 Faculty of Management and Economics

Course: Enterprise Management and Economics

doc. **Yuriy Valentynovych Bilan**, Ph.D.

Appointed with effect from: 1st August 2016

The significant social and economic factors of business development in the segment of SMEs

Abstract

Nowadays, entrepreneurship in the segment of small and medium-sized enterprises (SMEs) plays a key role in the economy of the European Union and the majority of countries of the world. It is well known that SMEs have specific features and fulfill important tasks in an economic system. Herewith, it should be noted that the majority of these SMEs are run by migrants or employ migrants.

Additionally, one should bear in mind that SMEs significantly contribute to higher employment and GDP, help to create a more intensely competitive environment which has great importance in relation to price and quality of products and services.

Also, SMEs with their flexibility help to fill the market space and they are bearers of important innovations. Moreover, SMEs must fight for customers and must seek the best location for them in the market. Consequently, SMEs ensure competition and thereby act against monopolistic tendencies.

However, for the successful development of SMEs it is necessary to create favourable conditions for the growth of business awareness and shape a good quality of business environment and effective relationships between firms and their environment, i.e. society, the state, politicians, banks, etc.

Moreover, the business environment in SME segment is determined by personal characteristics and motives of individual entrepreneurs, their creativity, risk taking and independence and by the entrepreneurial orientation.

Therefore, providing of better insights into this phenomenon is an up to date issue, especially considering the key role of SMEs and high mobility rate of entrepreneurs. Consequently, the main purpose of the present work is to investigate most significant social and economic factors of business development in the SMEs segment, as well as possible implications of the entrepreneurship and SMEs development in the light of migration experience, as well as the economic attitudes of the entrepreneurs towards their objectives.

This habilitation thesis outlines interconnection of entrepreneurship and SMEs development, influence of regional aspects on entrepreneurship and SMEs, role of personal characteristics of the entrepreneur, including youth entrepreneurship skills, as well as migration as one of the drivers of entrepreneurship and SMEs development.

doc. Ing. **Adam Pawliczek**, Ph.D.

Appointed with effect from: 1st December 2016

Internet and Its Influence on Online Buying Behaviour on B2C E-commerce Markets

Abstract

The presented habilitation thesis deals with the issue of knowledge of management methods, tools and systems in the area of strategic planning and continuous improvement as well as with their impact on business performance.

The aim of the thesis is to enrich the state of knowledge in this area and to answer the 7 key research questions asked by managers of SMEs and micro-enterprises with the help of 16 hypotheses.

The current state of knowledge in this area confirms the topicality of this issue as well as the positive contribution of management methods, tools and systems in the field of strategic planning and continuous improvement to business performance.

An original research design was proposed which uses, besides others, some lesser-known scientific methods such as the difference analysis, group benchmarking, quadratic index, correlation charts and cluster analysis, composite coefficients of performance, decision tree, fuzzy interpretation of interval data, interdisciplinary transfer of knowledge, and fractal analogy.

The questionnaire-based information obtained particularly in small and micro-enterprises of the Moravian-Silesian Region was the primary analyzed dataset.

The essential conclusions of the research have confirmed the positive contribution of management methods, tools and systems in the field of strategic planning and continuous improvement to various parameters of business performance. Management methods, tools and systems are used in companies together in certain clusters. The research also testifies low skills and the usage of the evaluated management techniques.

The main contribution of the thesis lies in finding answers to SMEs managers' questions, confirmation of the urgent needs of management education at higher levels and the transfer of knowledge from enterprises to academic-educational spheres, and vice versa. Within the theoretical part, a brief compendium of the examined management methods, tools and systems was made.

2.3 Faculty of Applied Informatics

Course: Machine and Process Control

doc. Ing. et Ing. **Bronislav Chramcov**, Ph.D.

Appointed with effect from: 1st May 2016

The Use of Mathematical Modelling and Computer Simulation for Design and Control of Production Systems

Abstract

This academic work is concerned with the possibilities of using Mathematical Modeling and Computer Simulation in the design and management of a variety of manufacturing, service, storage, and other systems. Taking into consideration the rich publishing activity of the author, this work has been compiled in the form of an annotated list of their past publications. The aim of this work is, based on concrete examples taken from industrial practice, to suggest possible approaches to using Mathematical Modeling and Simulation in order to streamline and optimize actual systems. Mathematical Modeling´s exploitation is presented in the form of an example drawn from the Heating Industry. Specifically, it suggests a model for time series of daily charts of supplies of heat - including the influence of meteorological variables acting on it that are linked to applications in thermal hot water supply-line performance management. The proposed specific approaches to exploiting computer simulation are presented in simulation studies - implemented in the context of close collaboration between the author and industrial practice. In the course of designing these mathematical models of production and logistics systems, use is also made of different heuristic approaches - in particular, to determine the appropriate (optimum) ranking of production orders so as to minimize production costs or the minimum production cycle. Significant publications by the author that indicate concrete results achieved in the construction of mathematical and computer models of real systems; or the results of subsequent simulation experiments, are provided in the Annexes in full version of work.

3 QUALIFYING LECTURES FOR PROFESSORSHIP

3.1 Faculty of Management and Economics

Course: Enterprise Management and Economics

prof. Ing. **Juraj Sipko,** PhD.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 26th January 2016
Appointed with effect from: 17st May 2016

Selected Aspects of Exchange Rates and Their Impact on Business and the Economy

Abstract

The main goal of the presented lecture is to analyse the development of exchange rates and their impact on the real economy and on price competitiveness. The breakdown of fixed exchange rates and the introduction of floating rates have led to relative instability of a majority of currencies in the area of the international monetary system.

This instability is present since the creation of floating rates. However, the real impact of exchange rate instability in the world economy was significant in the first half of the 80s and during the global financial crisis and the deep recession. Currently, there is a new phenomenon in the international monetary system, i.e. to move from a unipolar international monetary system to a multipolar international monetary system. It is expected that the multipolar international monetary system could eventually lead to the stabilisation of exchange rates.

The process of globalization of the world economy fosters competitiveness not only in the domestic, but also especially, in the international markets. In line with this, measuring price competitiveness is growing in importance. Real exchange rates create the base for measuring price competitiveness. They serve as the base for measuring competitiveness between individual countries. To assess the development of competitiveness, it is essential to compare price development in the tradable and non-tradable sectors.

In line with the increasing difficulty and complexity of analysing the development of exchange rates, but in particular, based on the overall changes in the position of the national, freely convertible and reserved currencies in the international monetary system, and their

impact on the real economy and business environment, it is essential to prepare teaching in the field of exchange rates and in all the three stages of university studies.

4 IMPORTANT SCIENTIFIC AND SPECIALIZED ASSIGNMENTS

4.1 Projectst financed by the Czech Science Foundation (GACR)

In 2016, 11 projects financed by the Czech Science Foundation were implemented at the TBU in Zlín. Total eligible costs amounted CZK 8,714 thousand for TBU in Zlín in 2016.

4.1.1 Faculty of Technology

Standard projects

GA16-05886S Investigation the effect of polymer melt shear and elongational rheology on production stability of meltblown nanofibers and films
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: prof. Ing. Martin Zatloukal, Ph.D. DSc.
Implementation period: 2016 - 2018

Total project cost (CZK thous.):	4 358
Total project cost – TBU (CZK thous.):	4 358
Project cost of TBU in 2016 (CZK thous.):	1 213

4.1.2 Faculty of Management and Economics

Postdocs grants

GP14-18597P Creating Strategic Performance Model Framework Based on Utilization of Synergy Effects of Selected Management Systems
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Ing. Michaela Blahová, Ph.D.
Implementation period: 2014 - 2017

Total project cost (CZK thous.):	623
Total project cost – TBU (CZK thous.):	623
Project cost of TBU in 2016 (CZK thous.):	0

GP14-21654P Variability of Cost Groups and its Projection in the Costing System in Manufacturing Enterprises
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Ing. Petr Novák, Ph.D.
Implementation period: 2014 – 2016

Total project cost (CZK thous.):	705
Total project cost – TBU (CZK thous.):	705
Project cost of TBU in 2016 (CZK thous.):	239

Standard projects

GA16-25536S Methodology of Developing a Predictive Model of Sector and Company Performance in the Macroeconomic Context
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: prof. Dr.Ing. Drahomíra Pavelková

Implementation period: 2016 – 2018
Total project cost (CZK thous.): 2 940
Total project cost – TBU (CZK thous.): 2 940
Project cost of TBU in 2016 (CZK thous.): 930

GA16-22141S Determinants of Spatial Allocation of EU Cohesion Policy Expenditures in the Context of Territorial Impact Assessment
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. RNDr.PhDr. Oldřich Hájek, Ph.D.
Implementation period: 2016 – 2017
Total project cost (CZK thous.): 1 124
Total project cost – TBU (CZK thous.): 1 124
Project cost of TBU in 2016 (CZK thous.): 586

4.1.3 Faculty of Applied Informatics

Projects where TBU acts as a co-investigator

Standard projects

GA15-06700S Unconventional control of complex systems
Principal investigator: VŠB – Technical University of Ostrava
Project investigator on behalf of TBU: doc. Ing. Roman Šenkeřík Ph.D.
Implementation period: 2015 - 2017
Total project cost (CZK thous.): 4 777
Total project cost – TBU (CZK thous.): 1 450
Project cost of TBU in 2016 (CZK thous.): 480

4.1.4 Faculty of Humanities

Standard projects

GA16-11983S German Literature and Culture in Moravian Wallachia: the European Dimension of the Regional Cultural Discourse
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Mgr. Libor Marek, Ph.D.
Implementation period: 2016 - 2018
Total project cost (CZK thous.): 1 218
Total project cost – TBU (CZK thous.): 1 218
Project cost of TBU in 2016 (CZK thous.): 378

4.1.5 University Institute

Postdocs grants

GP14-32114P The modification of magnetic filler and the study of its use in magnetorheological systems

Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Ing. Michal Sedlačík, Ph.D.
Implementation period: 2014 - 2016
Total project cost (CZK thous.): 1 532
Total project cost – TBU (CZK thous.): 1 532
Project cost of TBU in 2016 (CZK thous.): 498

Junior grants

GJ15-08287Y Immobilization of specific bioactive substances in functionalized biodegradable polymer matrices
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. Vladimír Sedlařík, Ph.D.
Implementation period: 2015 - 2017
Total project cost (CZK thous.): 5 765
Total project cost – TBU (CZK thous.): 5 765
Project cost of TBU in 2016 (CZK thous.): 1 934

GJ16-20361Y Smart systems based on modified graphene oxide particles
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Ing. Miroslav Mrlík, Ph.D.
Implementation period: 2016 - 2018
Total project cost (CZK thous.): 5 590
Total project cost – TBU (CZK thous.): 5 590
Project cost of TBU in 2016 (CZK thous.): 1 795

Projects where TBU acts as a co-investigator

Standard projects

GA16-05961S Advanced Carriers for Platinum Drugs
Principal investigator: Masaryk University
Project investigator on behalf of TBU: Mgr. Jan Vícha Ph.D.
Implementation period: 2016 - 2018
Total project cost (CZK thous.): 9 763
Total project cost – TBU (CZK thous.): 1 983
Project cost of TBU in 2016 (CZK thous.): 661

4.2 Projects financed by the Ministry of Industry and Trade of the Czech Republic

In 2016, 5 projects financed by the Ministry of Industry and Trade of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 1,488 thousand for TBU in Zlín in 2016.

4.2.1 Faculty of Management and Economics

The Operational Programme Enterprise and Innovations (OP PI)

Ergonomics of Minor Muscle Tension - Production Processes Improving
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. David Tuček, Ph.D.
Implementation period: 2014 - 2016

Total project cost (CZK thous.):	1 300
Total project cost – TBU (CZK thous.):	1 300
Project cost of TBU in 2016 (CZK thous.):	0

4.2.2 Faculty of Applied Informatics

The Operational Programme Enterprise and Innovations for Competitiveness (OP PIK)

CZ.01.1.02/0.0/0.0/15_019/0004635 E-Line Fuel Dispenser
Principal investigator: Adast Systems, a. s.
Project investigator on behalf of TBU: Ing. Tomáš Dulík, Ph.D.
Implementation period: 2016 - 2018

Total project cost (CZK thous.):	20 497
Total project cost – TBU (CZK thous.):	2 070
Project cost of TBU in 2016 (CZK thous.):	568

4.2.3 University Institute

Projects where TBU acts as a co-investigator

TRIO Programme

FV10756 Development of polymer carriers in sub-micro and nano-forms
Principal investigator: MVDr. Jiří Pantůček
Project investigator on behalf of TBU: doc. Ing. Vladimír Sedlařík, Ph.D.
Implementation period: 2016 - 2020

Total project cost (CZK thous.):	3 818
Total project cost – TBU (CZK thous.):	1 909
Project cost of TBU in 2016 (CZK thous.):	159

The Operational Programme Enterprise and Innovations for Competitiveness (OP PIK)

CZ.01.1.02/0.0/0.0/15_019/0004549 Imflamable systems according to EN 45545 for composite fabrication
Principal investigator: 5M s. r. o.
Project investigator on behalf of TBU: Ing. Miroslav Mrlík, Ph.D.
Implementation period: 2016 - 2019

Total project cost (CZK thous.):	8 609

Total project cost – TBU (CZK thous.): 1 375
Project cost of TBU in 2016 (CZK thous.): 344

CZ.01.1.02/0.0/0.0/15_019/0005090 Stenopic opening for correction of presbyopia
Principal investigator: GEMINI oční klinika, a. s.
Project investigator on behalf of TBU: doc. Ing. et Ing. Ivo Kuřitka Ph.D. et Ph.D.
Implementation period: 2016 - 2019
Total project cost (CZK thous.): 3 600
Total project cost – TBU (CZK thous.): 2 464
Project cost of TBU in 2016 (CZK thous.): 417

4.3 Projects financed by the Ministry of Education, Youth and Sports of the Czech Republic

In 2016, 10 projects financed by the Ministry of Education, Youth and Sports of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 83,908 thousand for TBU in Zlín in 2016.

4.3.1 Faculty of Technology

Projects where TBU acts as a co-investigator

VES 15 EUREKA CZ Programe

LF15016 Research and development of a system for acquiring data to predict the speed of growth of children's feet
Principal investigator: ISSA CZECH s. r. o.
Project investigator on behalf of TBU: Ing. Jitka Baďurová, Ph.D.
Implementation period: 2015 - 2018
Total project cost (CZK thous.): 9 846
Total project cost – TBU (CZK thous.): 1 664
Project cost of TBU in 2015 (CZK thous.): 757

4.3.2 Faculty of Applied Informatics

National Programme for Sustainability

LO1303 Promoting sustainability and development of the Centre for Security, Information and Advanced Technologies (CEBIA-Tech)
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: prof. Ing. Vladimír Vašek, CSc.
Implementation period: 2014 – 2019
Total project cost (CZK thous.): 98 710
Total project cost – TBU (CZK thous.): 98 710
Project cost of TBU in 2016 (CZK thous.): 16 842

4.3.3 Faculty of Humanities

Educational Policy Fund

From Beginner to Mentor (supporting strategies of teacher education in the Zlín Region) Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. PaeDr. Adriana Wiegerová, PhD.
Implementation period: 2014 – 2016
Total project cost (CZK thous.): 9 556
Total project cost – TBU (CZK thous.): 9 556
Project cost of TBU in 2016 (CZK thous.): 1 587

4.3.4 University Institute

National Programme for Sustainability

LO1504 Centre of Polymer Systems Plus
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. Vladimír Sedlařík, Ph.D.
Implementation period: 2015 - 2020
Total project cost (CZK thous.): 325 648
Total project cost – TBU (CZK thous.): 325 648
Project cost of TBU in 2016 (CZK thous.): 63 400

6th FP of the European Community for Research, Technological Development and Demonstration Activities

7AMB16AT033 Fiber Reinforced Polymers with Integrated Carbon Nanotubes Networks
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. Petr Slobodian Ph.D.
Implementation period: 2016 - 2017
Total project cost (CZK thous.): 148
Total project cost – TBU (CZK thous.): 148
Project cost of TBU in 2016 (CZK thous.): 74

7AMB15AT014 New Surface Functional Fillers Based on Lignocellulose: Response to Moisture and Biological Properties
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. Marián Lehocký, Ph.D.
Implementation period: 2015 - 2016
Total project cost (CZK thous.): 152
Total project cost – TBU (CZK thous.): 152
Project cost of TBU in 2016 (CZK thous.): 76

Czech-Polish Projects

7AMB16PL070 Novel processing techniques of biodegradable polymers for biomedical applications

Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. Vladimír Sedlařík, Ph.D.
Implementation period: 2016 - 2017
Total project cost (CZK thous.): 170
Total project cost – TBU (CZK thous.): 170
Project cost of TBU in 2016 (CZK thous.): 95

Czech-Bavarian Cooperation

8E15B007 Experimental investigation on rubbers mechanical behaviour under fatigue loading conditions including chemo-chemothermomechanical
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Dr. Ing. Radek Stoček
Implementation period: 2016 - 2017
Total project cost (CZK thous.): 332
Total project cost – TBU (CZK thous.): 332
Project cost of TBU in 2016 (CZK thous.): 58

KONTAKT II Programme

LH14050 Synthesis of Polypeptoid Nanosheets for Biomineralization
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Nabanita Saha, M.Sc., Ph.D.
Implementation period: 2014 - 2016
Total project cost (CZK thous.): 1 348
Total project cost – TBU (CZK thous.): 1 348
Project cost of TBU in 2016 (CZK thous.): 375

LH14273 Construction and electrochemical properties of supercapacitors for high efficiency energy storage systems
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: prof. Ing. Petr Sáha, CSc.
Implementation period: 2014 - 2016
Total project cost (CZK thous.): 1 797
Total project cost – TBU (CZK thous.): 1 797
Project cost of TBU in 2016 (CZK thous.): 644

4.4 Projects financed by the Ministry of the Interior of the Czech Republic

In 2016, 1 project financed by the Ministry of the Interior of the Czech Republic was implemented at the TBU in Zlín. Total eligible costs amounted CZK 2,185 thousand for TBU in Zlín in 2016.

4.4.1 Faculty of Applied Informatics

Projects where TBU acts as a co-investigator

Security Research Programme in the Czech Republic

VI20152019049 RESILIENCE 2015: Dynamic Resilience Evaluation of Interrelated Critical Infrastructure Subsystems
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Ing. Martin Hromada, Ph.D.
Implementation period: 2015 - 2019

Total project cost (CZK thous.):	38 076
Total project cost – TBU (CZK thous.):	9 686
Project cost of TBU in 2016 (CZK thous.):	2 185

4.5 Projects financed by the Ministry of Agriculture of the Czech Republic

In 2016, 2 projects financed by the Ministry of Agriculture of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 2,272 thousand for TBU in Zlín in 2016.

4.5.1 Faculty of Technology

Projects where TBU acts as a co-investigator

KUS - Comprehensive Sustainable Systems in Agriculture

QJ1210300 Protection systems of quality and safety of dairy products by means of suitable methods applicable in practice
Principal investigator: Výzkumný ústav mlékárenský s. r.o.
Project investigator on behalf of TBU: doc. Ing. František Buňka, Ph.D.
Implementation period: 2012 - 2016

Total project cost (CZK thous.):	20 093
Total project cost – TBU (CZK thous.):	2 984
Project cost of TBU in 2016 (CZK thous.):	562

4.5.2 University Institute

KUS - Comprehensive Sustainable Systems in Agriculture

QJ1310254 Research into the use of whey as dairy industry waste product, the production of antimicrobial compounds for the modification of hydrophilic polymer systems
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. Vladimír Sedlařík, Ph.D.

Implementation period: 2013 - 2017
Total project cost (CZK thous.): 16 351
Total project cost – TBU (CZK thous.): 7 289
Project cost of TBU in 2016 (CZK thous.): 1 710

4.6 Projects financed by the Technology Agency of the Czech Republic

In 2016, 7 projects financed by the Technology Agency of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 13,714 thousand for TBU in Zlín in 2016.

4.6.1 Faculty of Technology

Projects where TBU acts as a co-investigator

ALFA Programme

TA04020258 Advanced technology of lithotrophic immobilization and anaerobic bioremediation for the remediation and prevention of environmental damage
Principal investigator: EPS, s. r. o.
Project investigator on behalf of TBU: doc. Mgr. Marek Koutný, Ph.D.
Implementation period: 2014 - 2017
Total project cost (CZK thous.): 18 261
Total project cost – TBU (CZK thous.): 2 939
Project cost of TBU in 2016 (CZK thous.): 995

EPSILON Programme

TH01030054 The possibility of PES waste shredded material and next technological waste processing
Principal investigator: Fatra, a. s.
Project investigator on behalf of TBU: doc. Ing. Dagmar Měřínská, Ph.D.
Implementation period: 2015 - 2017
Total project cost (CZK thous.): 10 070
Total project cost – TBU (CZK thous.): 2 403
Project cost of TBU in 2016 (CZK thous.): 805

4.6.2 Faculty of Management and Economics

OMEGA Programme

TD03000370 Supporting Methodology for Creation, Updating and Evaluation of School Education Programmes in Primary and Secondary Education Respecting Good Practice of Strategic Planning
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. RNDr. PhDr. Oldřich Hájek Ph.D.

Implementation period: 2016 - 2017
Total project cost (CZK thous.): 668
Total project cost – TBU (CZK thous.): 668
Project cost of TBU in 2016 (CZK thous.): 334

4.6.3 University Institute

Programme Competence Centre

TE01020216 Centre of advanced polymer and composite materials
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. Tomáš Sedláček, Ph. D.
Implementation period: 2012 - 2019
Total project cost (CZK thous.): 209 644
Total project cost – TBU (CZK thous.): 69 077
Project cost of TBU in 2016 (CZK thous.): 8 830

Projects where TBU acts as a co-investigator

TE02000006 Centre for alternative environment friendly high effective polymer antimicrobial agents for industrial applications
Principal investigator: SYNPO, akciová společnost
Project investigator on behalf of TBU: doc. Ing. Vladimír Sedlařík, Ph.D.
Implementation period: 2014 - 2019
Total project cost (CZK thous.): 126 650
Total project cost – TBU (CZK thous.): 11 300
Project cost of TBU in 2016 (CZK thous.): 2 300

EPSILON Programme

TH01011438 Development of polyurethane matrices for composite production
Principal investigator: 5M s. r. o.
Project investigator on behalf of TBU: doc. Ing. Michal Sedlačík, Ph.D.
Implementation period: 2015-2017
Total project cost (CZK thous.): 11 250
Total project cost – TBU (CZK thous.): 1 350
Project cost of TBU in 2016 (CZK thous.): 450

GAMA Programme

TG03010052 Commercialization at the Tomas Bata University in Zlin
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Ing. Ivana Bartoníková
Implementation period: 2016-2019
Total project cost (CZK thous.): 10 813
Total project cost – TBU (CZK thous.): 10 813
Project cost of TBU in 2016 (CZK thous.): 0

4.7 PROJECTS - SUMMARY

Number of projects implemented in 2016

Component part / Provider	Czech Science Foundation	Ministry of Industry and trade of the Czech Republic		Ministry of Education, Youth and Sports of the Czech Republic	Ministry of the Interior of the Czech Republic	Ministry of Agriculture of the Czech Republic	Technology Agency of the Czech Republic	Total
		MIT total	Operational Programme projects					
Faculty of Technology	1	0	0	1	0	1	2	5
Faculty of Management and Economics	4	1	1	0	0	0	1	6
Faculty of Multimedia Communications	0	0	0	0	0	0	0	0
Faculty of Applied Informatics	1	1	1	1	1	0	0	4
Faculty of Humanities	1	0	0	1	0	0	0	2
Faculty of Logistics and Crisis Management	0	0	0	0	0	0	0	0
TBU Library	0	0	0	0	0	0	0	0
University Institute	4	3	2	7	0	1	4	19
Rectorate	0	0	0	0	0	0	0	0
TBU total	11	5	4	10	1	2	7	36

Total costs acknowledged for TBU in Zlín in 2016 (in CZK thousands)

Component part / Provider	Czech Science Foundation	Ministry of Industry and trade of the Czech Republic		Ministry of Education, Youth and Sports of the Czech Republic	Ministry of the Interior of the Czech Republic	Ministry of Agriculture of the Czech Republic	Technology Agency of the Czech Republic	Total
		MIT total	Operational Programme projects					
Faculty of Technology	1213	0	0	757	0	562	1800	4 332
Faculty of Management and Economics	1 755	0	0	0	0	0	334	2 089
Faculty of Multimedia Communications	0	0	0	0	0	0	0	0
Faculty of Applied Informatics	480	568	568	16 842	2 185	0	0	20 075
Faculty of Humanities	378	0	0	1 587	0	0	0	1 965
Faculty of Logistics and Crisis Management	0	0	0	0	0	0	0	0
TBU Library	0	0	0	0	0	0	0	0
University Institute	4888	920	761	64 722	0	1 710	11580	83 820
Rectorate	0	0	0	0	0	0	0	0
TBU total	8 714	1 488	1 329	83 908	2 185	2 272	13 714	112 281

Science Activity Annual Report

2016

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