

 **Tomas Bata University in Zlín**

Science Activity Annual Report

2019

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1 DEFENDED DOCTORAL THESES

In 2019, a total of 40 theses were defended: 18 at the Faculty of Technology, 8 at the Faculty of Management and Economics, 5 at the Faculty of Multimedia Communications, 8 at the Faculty of Applied Informatics, and 1 at the Faculty of Humanities.

1.1 Faculty of Technology

Degree Programme: CHEMISTRY AND MATERIALS TECHNOLOGY

Degree Course: Technology of Macromolecular Compounds

Ing. **Petr Krčmář**, Ph. D.

Date of defence: 13. 6. 2019

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

Fully inkjet printed gas and humidity CuO sensor on flexible polymer substrate

Abstract

The thesis is concerned with material printing methods, among which the greatest attention is paid to the inkjet printing. The main advantage of inkjet printing consists of the possibility of using wide range of printing liquids (solutions or dispersions) called inks, which however meet relatively limited range of requirements for suitable viscosity and surface tension. The work concentrates on preparation of inkjet ink based on copper oxide nanoparticles for material printing on polymer flexible substrates and its possible application as a sensor of humidity and volatile organic compounds at room temperature. The ink composition was developed on the basis of measurement of viscosity and surface tension which were optimized by addition of polymeric steric surfactants. The printing process was optimized with the help of dimensionless criteria and the aid of drop watch camera system integrated in used "Dimatix DMP 2800 series" printer which allows manipulation of the electronic pulses to the piezo jetting device for controlling of the drop characteristics as it is ejected from the nozzle. Polyethylene terephthalate (PET) film was selected as the most representative substrate used

in polymer electronics. Silver nano-ink was used for printing of an interdigitated pattern which was overprinted by the copper oxide ink obtaining thus a flexible flat sensor for detecting alcohol vapours. Printed layers and motives on the substrate were characterized microscopically and the conductivity was evaluated by four-point probe method. Effectiveness of prepared sensor was demonstrated by measuring its response to the vapours of water and alcohols. A specific low temperature sensing mechanism was revealed. The applicability of prepared sensing devices was demonstrated by fabrication and testing of a sensor field integrating a 3 x 3 matrix of sensing elements on the PET substrate. Further investigation in this direction is envisaged and an overview of results achieved so far is included.

Ing. **Milan Masař**, Ph.D.

Date of defence: 12. 12. 2019

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

Preparation and characterization of functional fillers with photocatalytic activity

Abstract

Semiconductor photocatalysis has been studied in detail for a large variety of applications, such as water splitting or water and air treatment in the last decades. The most used photocatalysts are wide bandgap semiconductors, which are effective only under UV irradiation. In order to efficiently utilize visible solar radiation, various types of visible-light active photocatalysts are investigated. In the first part of this thesis, a literature survey on this topic is presented. According to the state-of-the-art description and current experience at the Centre of Polymer Systems in the research group of Multifunctional Nanomaterials, the Aim, goals, and objectives of the work were defined. Various types of ZnO photocatalysts were synthesized as a material base and characterized using by properly chosen analytical techniques. Later, these prepared photocatalysts were doped by native oxygen vacancies, and the effectivity of photocatalytic reaction was shifted to the visible light region. In the third part of this thesis, decoration of photocatalysts by silver nanoparticles was examined and shown to be an effective way of increasing the overall efficiency of the photocatalytic process. Lastly,

macromolecular photocatalyst (graphitic carbon nitride) was investigated, and its photocatalytic activity was studied. Simultaneously, an online system for measuring of the photocatalytic activity has been developed following the current ISO norms.

Ing. **Jan Mašlík**, Ph.D.

Date of defence: 13. 6. 2019

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

Preparation of Conductive and Semiconductive Patterns by Digital Printing of Nanodispersions for Sensing Devices of Organic Compound Vapours

Abstract

To simplify, accelerate, and facilitate production processes, ink-jet technology appears to be a very effective and inexpensive alternative to conventional deposition methods. Nowadays, it is rapidly developing in electronics, with the help of conductive polymers and various materials in the form of nanoparticles. The thesis deals with inkjet printing technology as a deposition technique of functional materials in the form of thin films and their applications. The literature review covers the current state and possibilities of inkjet technologies as well as the used materials, their compatibility with the printing equipment, the fabrication process, and the final application. First, it was necessary to optimize the fabrication of conductive interconnects from silver nanoparticles on flexible polymer foils. Then, ITO (indium tin oxide) nanoparticle ink was developed and characterized for application in sensing devices detecting vapours of the organic volatile compounds. As a side product of this work, a framework for ink and inkjet printing process optimization using dimensionless criteria was developed. The last part of presented results is devoted to a successful development of a ZnO nanowire forest hydrothermal deposition method and their utilization in preparation of the IDE designed printed sensor on a polymer substrate. Then, the same technique was applied for developing a novel low temperature operated miniature gas sensing device prepared directly on the top of the quartz window of a UV emitting LED using UV activation of the semiconducting ZnO sensing layer replacing high temperature activation.

David Milićević, Ph.D.

Date of defence: 12. 6. 2019

Supervisor: doc. Ing. Stanislav Kafka, CSc.

Preparation and Study of Photoprotective and Antimicrobial Properties of Novel Materials Based on 1,2,3-Triazole

Abstract

A class of novel 1,2,3-triazole functionalised quinoline-2,4-diones was synthesized using multi-step reaction approach, starting with the synthesis of suitable organic azides that served as precursors for introduction of the first 1,2,3-triazole ring to the quinoline-2,4-dione framework. Afterwards, desirable bis-triazole esters were obtained by acetylation of mono-triazole alcohols, subsequent introduction of propargyl group to the position N1 of quinolone heterocycle, and finally employment of copper(I)-catalysed "click" reaction using three different organic azides. Resulted bis- as well as mono-triazole acetates were then deprotected using acidic alcoholysis, while provided alcohols were further oxidized to suitable aldehydes and carboxylic acids. While crystallization of synthesized compounds was normally performed in case of mono-triazoles, it was seldom successful for bis-triazole species. Consequently, quinolones with two 1,2,3-triazole rings were purified mostly by silica-gel column chromatography. During the fulfilment of outline transformation scheme, various reaction conditions and synthetic routes were tested, monitored, and finally optimised. Apart from mainstream reaction pathway, some focus was also devoted to a few accompanying transformations that either highlighted interesting behaviour of the studied systems (quinoline-2,4-dione ring cleavage), or could be exploited as an alternative approach to anthranilic acid derivatives preparation. Several synthesized materials were also evaluated for their potential ligand-to-metal coordination abilities, as well as antimicrobial activities against ten microbial strains, including bacteria, yeast and fungi. Additionally, their potential photoprotective characteristics were also briefly examined. Regrettably, no interesting physical properties or biological activities were detected for any of the tested compounds. The vast majority of results obtained throughout my doctoral studies and presented in this dissertation, have already been published or will be published in scientific journals with the impact factors.

Mgr. **Petra Rejmontová**, Ph.D.

Date of defence: 18. 7. 2019

Supervisor: doc. Ing. Petr Humpolíček, Ph.D.

Modification of polymers to the targeted cell response

Abstract

Polymers play a crucial role in the preparation of biomaterials for tissue engineering and regenerative medicine. The biocompatibility and ability to be combined with other materials to produce desirable 3D structure are critical properties for their real application. The thesis is focused on the modification of polymers in its native form, composites or copolymers with mentioned properties to achieve desirable interaction with the eukaryotic cells in terms of the cell adhesion, growth, proliferation, differentiation and death. The interaction of materials with the cells was studied in the cell laboratory using advanced in vitro techniques.

Ing. **Jakub Ševčík**, Ph.D.

Date of defence: 12. 12. 2019

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

Preparation and characterisation of nanocomposite thin films applicable in organic electronics

Abstract

In this work, the recently obtained experimental results in the field of bandgap engineered nano ZnO/MEH-PPV (poly[2-methoxy-5-(2-ethylhexyloxy)-1,4-phenylenevinylene]) are presented, mainly thin nanocomposite films preparation, their electronic structure and properties characterization and implementation of them as active layers into the PLED devices. The influence of the nanoparticle size and composition, the thickness of thin films and parameters during their preparation on the optoelectronic properties and PLEDs performance are studied. Electronic structure of such nanocomposite films was studied with energy-resolved electrochemical impedance spectroscopy for the first time. Addition of any of the studied nanoparticles enhanced the luminance of prepared diodes in comparison with reference samples made from neat MEH-PPV polymers. Nanoparticle concentration, size and thin film

thickness optimum was found for pure ZnO system within the range of tested parameters. Two principally different dopants - iron and aluminium - were used to modify the bandgap of the material and effects of concentration of the dopants in nanoparticles was investigated. The Fe-doping decreases the maximum luminance of the diode at given operating voltage in comparison with the reference undoped ZnO nanocomposite; however, it also decreases the opening bias significantly. Thus, Fe-doping opens a way to a search for the best balance between these two effects and finding an optimum power efficiency in this case. Significant enhancement of examined performance parameters in comparison with the reference undoped ZnO system was achieved for Al-doped samples. Both the opening bias and luminance of the diode were greatly enhanced by using this material.

Degree Programme: CHEMISTRY AND MATERIALS TECHNOLOGY

Degree Course: Chemistry and materials technology

Ing. Michal Zálešák, Ph.D.

Date of defence: 31. 1. 2019

Supervisor: doc. RNDr. Jan Růžička, Ph.D.

Microbial degradation of chlorinated ethenes and its potential application for in-situ bioremediation

Abstract

The doctoral thesis deals with microbial degradation of chlorinated ethenes and its potential application for in-situ bioremediation. In a theoretical part of the thesis, the main reasons of soil and groundwater contamination by these compounds along with their transport and a fate in a subsurface environment are briefly outlined. The thesis then focuses on common procedures that must be undertaken prior to selecting a suitable remediation method at contaminated sites. Further, the thesis summarizes various microbial processes leading to a transformation and degradation of all chlorinated ethenes and outlines several options for the use of these processes within in-situ bioremediation of affected sites. Special attention is paid to aerobic cometabolic degradation of all three dichloroethenes by pure bacterial strains in a mineral salt medium. The theoretical part of the thesis ends with a chapter devoted to

field demonstrations of in-situ bioremediation for clean-up of sites polluted by chlorinated ethenes. A following experimental part of the thesis deals with degradation of selected chlorinated ethenes by *Comamonas testosteroni* strain RF2 and by several consortia in the mineral salt medium. At first, strain RF2 was tested to investigate its capacity for degrading 1,2-cis-dichloroethene (cDCE), 1,2-trans-dichloroethene (tDCE), and 1,1-dichloroethene (1,1DCE). Degradation assays were performed for single DCEs, as well as for a mixture of DCEs with TCE, which resembled contaminated plume in groundwater. Strain RF2 was capable of efficiently removing all three dichloroethenes (DCEs) at the initial aqueous concentrations of 6.01 mg L⁻¹ for cDCE, 3.80 mg L⁻¹ for tDCE and 0.65 mg L⁻¹ for 1,1DCE, with a removal efficiency of 100 % for cDCE, 65.8 % for tDCE, and 46.8 % for 1,1DCE. Furthermore, complete removal of TCE, cDCE and 1,1DCE (122.5 mikrog L⁻¹, 84.3 mikrog L⁻¹ and 51.4 mikrog L⁻¹, respectively) were observed in a mixture sample that also contained 72.33 mikrog L⁻¹ of tDCE, which was removed to the amount of 72.3%. Moreover, degradation of cDCE (6.01 mg L⁻¹) led to a 92.2 % release of inorganic chloride, and 2,2-dichloroacetaldehyde was determined as the first intermediate of cDCE transformation. Further, a consortium composed of the strain RF2 and vinyl chloride (VC) utilizing *Mycobacterium aurum* DSM-6695 was tested to investigate its capacity for degrading TCE (115.7 mikrog L⁻¹), cDCE (662 mikrog L⁻¹), tDCE (42.01 mikrog L⁻¹), 1,1DCE (16 mikrog L⁻¹), and VC (7 mg L⁻¹; "all in a liquid phase") in mixed samples. The consortium was able to nearly completely remove all the compounds in the mixed sample within 21 days of the assay. The findings of this thesis suggest that the consortium composed of the strain RF2 and *M. aurum* DSM-6695 exhibits the potential to remediate groundwater contaminated with chlorinated ethenes.

Degree Programme: FOOD CHEMISTRY AND TECHNOLOGY

Degree Course: Food Technology

Mgr. **Jana Orsavová**, Ph.D.

Date of defence: 6. 6. 2019

Supervisor: doc. Ing. Jiří Mlček, Ph.D.

Bioactive Compounds of Non-traditional Plant Raw Material

Abstract

Finding alternative sources of nutrition has currently been an important subject of many scientific institutions. Fruits of old regional varieties and fruit trees of non-traditional botanical species, which were used for human nutrition in ancient times and have been nowadays cultivated as significant landscape elements, are a substantial source of bioactive substances with positive effects on human health mainly associated with their antioxidant activity. The aim of this dissertation is to determine significantly represented biologically active substances exhibiting antioxidant activity in selected samples of different non-traditional fruit species and to assess correlations of their content with the variety. Furthermore, to determine the most valuable cultivar of each species and to identify the most valuable botanical species. Based on the gained data, cultivars of cornelian cherry, sweet rowanberry and black chokeberry, sea buckthorn and honeyberry with the best properties have been specified. It is Fruchtal for cornelian cherry, Granatina for interspecies crossbreed of sweet rowanberry and black chokeberry, Krasavica for sea buckthorn and Amfora for honeyberry. Honeyberries have been assessed as the most valuable species from all the analysed botanical species.

Ing. **Lukáš Snopek**, Ph.D.

Date of defence: 8. 10. 2019

Supervisor: doc. Ing. Jiří Mlček, Ph.D.

Changes of Bioactive Compounds and Sensorially Significant Substances Present in Grape Wines during their Storage

Abstract

Wine is one of the most frequently consumed alcoholic beverages worldwide due to its organoleptic qualities, such as aroma and taste, and also due to the alcohol, sugars and acids, and minerals presence that together form the bouquet of wine. Positive health effects are also an important factor, mainly due to the presence of many bioactive compounds in wine, such as antioxidants. These are mainly polyphenolic compounds, which include phenolic acids, flavonoids, anthocyanins and catechins and resveratrol, as the most effective antioxidants

of wine. The dissertation thesis deals with the determination of significant oenological parameters and also sensory important substances in wines (SO₂, alcohol, saccharides (sugars), organic acids, aromatic substances) as well as relevant biologically active substances that show antioxidant activity (polyphenols, flavonoids, anthocyanins), and also by monitoring their changes during wine storage (1 - 12 months) in selected samples of white, red and rosé wines. Subsequently, the results are evaluated by correlation analysis and also by multivariate statistical method, cluster analysis. Traditional white and red wine varieties from the region of Moravia, sub-regions Slovácká and Velkopavlovická, were selected for the determination. These were white varieties of wine, namely Hibernál, Chardonnay, Müller Thurgau, Moravian Muscat, Palava, Pinot Blanc, Pinot Gris, Riesling, Sauvignon, Sylvaner Green, Traminer, Veltliner Green and Cuvée (a mixture of Devin and Moravian Muscat) of the 2003 - 2018 harvest. The red wines were André, Dornfelder, Lemberger, Merlot, Blue Portugal, Neronet, Pinot Noir, Zweigeltrebe and Cuvée (Methodus and Tupes Starohorské) of the 2011 - 2018 harvest. Rosé wines were also analyzed (Frankovka rosé, Merlot rosé, Pinot Noir rosé, St. Laurent rosé and Zweigeltrebe rosé) of the 2011 - 2018 harvest. The best evaluated wines in terms of antioxidant parameters (total content of polyphenols, flavonoids, anthocyanins, antioxidant activity values) were red wines. Rosé and white wines have these values several times lower. Red wine varieties that show significant antioxidant activity include the Zweigeltrebe, Pinot Noir and Neronet varieties, to the rosé varieties with high antioxidant activity belong St. Lawrence Rosé and Pinot Noir Rosé, and to the white grape varieties Moravian Muscat, Sauvignon and Sylvaner. Storage of wines leads to a decrease of the given parameters, in various range for different types of wines.

Degree Programme: PROCESS ENGINEERING

Degree Course: Tools and processes

Ing. **Tomáš Fiala**, Ph.D.

Date of defence: 27. 6. 2019

Supervisor: doc. Ing. Miroslav Maňas, CSc.

Study of the influence of process parameters on hardness of injected polymers

Abstract

The dissertation thesis deals with research of the polymer material properties and their dependence on the parameters of injection process. There were two commodity materials compared in this study. As the amorphous one the polycarbonate and polyethylene as the semicrystalline were selected. For measuring and investigating of mechanical properties and their changes the depth sensing indentation (DSI) method was used. The structure of injected polymers was checked by microscopy methods. There were the property changes based on the melt temperature studied in this thesis.

Ing. **Eva Hnátková**, Ph.D.

Date of defence: 5. 6. 2019

Supervisor: doc. Ing. Zdeněk Dvořák, CSc.

Influence of binder composition on powder injection moulding process

Abstract

Powder injection moulding (PIM) is a modern technological process combining powder metallurgy and plastic injection moulding. PIM is suitable for mass production of small metal or ceramic items, with complex geometry and tight tolerances. Polymer binders for PIM technology are still in the developing area due to the complexity of their requirements. One of the main challenges in PIM technology is optimization of PIM process and detection/elimination of powder binder separation resulting in inhomogeneous final products. The research team at Tomas Bata University in Zlin under prof. Hausnerova has been involved in investigating the interactions and chemical mechanisms occurring within a binder system. The aim of this thesis is devoted to polymer binder composition based on previous results, including binder components characterization and their influence on PIM process. Particular emphasis was also placed on an eco-friendly approach and maximisation of solid loading. Major component/s of binder systems provide low viscosity and easy removal in the first stage of debinding. Polyethylene glycol (PEG) is a suitable candidate due its non-toxicity, solubility in water and commercial availability. The first part was dedicated to the effect of PEG molecular weight on the overall PIM process. Results showed that PEG molecular

weight affected processing parameters, but without any final impact on mechanical properties of sintered Inconel 718. Feedstock viscosity can be tailored via PEG molecular weight. The second part was devoted to backbone components, especially to carnauba wax (CW) and acrawax (AW) as possible substituents of polyolefin based binder systems. Previous research showed twice stronger binding for AW/PEG than for CW/PEG, suggesting strong interactions between polymers. Feedstocks based on CW and AW showed overall lower viscosity than polyolefin-based ones and commercial feedstocks, and additionally a binder based on CW, could be used for reactive powders due to low processing temperatures. Concentration of stearic acid (SA) as a surface active agent was investigated in third part in order to increase powder loading and improve flow properties of feedstocks. Surfactant SA positively affected processing parameters and its appropriate concentration is strongly dependent on binder composition. Optimal concentration of SA can increase maximal powder loading. Binders are designed as multi-component polymer systems, in which each component performs a specific task. Better understanding of each component in this process can help eliminate some drawbacks, improve processing and produce less defective parts.

Ing. **Jakub Huba**, Ph.D.

Date of defence: 27. 6. 2019

Supervisor: prof. Ing. Berenika Hausnerová, Ph.D.

Mold Design Concept for Injection Molding of Highly Filled Compounds

Abstract

The thesis discusses the mold design for highly filled polymer melts, with a special emphasis on powder injection molding (PIM) compounds, which substantially differs from mold design requirements applied to conventional thermoplastic injection molding. First part of the Thesis is devoted to a phase separation during injection molding. The mold design to quantify separation recently proposed by the PIM research group at TBU is treated with flow simulation approach (Moldflow). The data obtained from a capillary rheometry (viscosity) and differential scanning calorimetry (specific heat capacity) and modified transient plane source technique (thermal conductivity) is implemented to Cross model, where temperature-induced physical changes are predicted with the help of Williams-Landel-Ferry equation (WLF). Both models are used for simulations, and according to the results obtained, the new

mold design is proposed. Simultaneously, the phase separation is detected with computed tomography on the real samples of stainless steel feedstock used in PIM. As it is found that the separation is closely related to shear rate gradients accompanied with temperature changes, infra-red sensors are installed into the new testing mold to intercept the areas prone to this issue. Real observations made on PIM compounds are compared with simulated ones, and statistically analysed. Second part of the Thesis is focused on a common problem during injection molding - weld line formation, which is most severe for highly filled polymers due to a lack of polymer entanglement across the approaching of the flow fronts. To increase time for an entanglement, the mold inserts from various materials (copper, aluminum, bronze, epoxy resin, and epoxy resin with hexagonal boron nitride, acrylic 3D printing material) with different thermal conductivity are used. It is shown (with the support of carefully selected statistical methods) that in case of conventional highly filled compounds as wooden plastic composites, weld lines have a considerable effect on the tensile strength, while for PIM feedstocks have not, but the presence of a weld line in a PIM part may be beneficial as it results in the shortening of the filling trajectory, and subsequently, leads to the time saving during molding.

Ing. **Lenka Hýlová**, Ph.D.

Date of defence: 7. 11. 2019

Supervisor: doc. Ing. Michal Staněk, Ph.D.

The Influence of Beta Radiation on Micro-Hardness of Polymers

Abstract

The study deals with the influence of electron beam radiation in the doses of 0, 66, 99 and 132 kGy on micro-mechanical properties of polymers, especially polyamide 6 filled with 1 - 6 wt. % of crosslinking agent triallylisocyanurate (TAIC). Indentation hardness, indentation elasticity modulus and indentation creep were measured from micro-mechanical properties. As a proof of cross-linking, the method of thermo-mechanical analysis (TMA) and of degradation, the Fourier transform infrared spectroscopy (FTIR) were chosen. In addition, surface topography using atomic force microscopy (AFM) was also investigated.

Ing. Václav Janošík, Ph.D.

Date of defence: 7. 11. 2019

Supervisor: doc. Ing. Michal Staněk, Ph.D.

The Effect of Pigments on the Plastic Product Properties

Abstract

This dissertation thesis deals with the influence of the concentration of commercial color concentrates on the final properties of plastic part. Two polymeric materials were chosen for experimental purposes. One was a representative of amorphous materials; namely polycarbonate sold under the trade name Lexan 923a. The other material was a representative of semi-crystalline polypropylene distributed under the trade name Mosten. These materials are commonly used in industry and they are usually processed by injection technology. Three commercial color concentrates from Lifocolor company for coloring polycarbonate and two color concentrates from Maxithen company for coloring polypropylene were chosen in order to investigate the effect of color concentrates. These above mentioned color concentrates are recommended by manufacturers for dyeing selected polymeric materials. In the first part of the thesis, the influence of color concentrates on the mechanical properties of polymeric materials was investigated. Emphasis was placed on measurement of tensile test and impact strength. The tensile test measurements were evaluated by the parameters of ultimate strength, Young's modulus and elongation. Parameters of notch toughness coefficient and maximum force were evaluated from impact test. The next part was focused on the measurement of colorimetric properties and quantification of the color shade, including the degree of coloring using a colorimetric device. The emphasis was also placed on measuring the dimensional stability. It means how the concentration of the color concentrate in the polymeric material affects this stability. Subsequently, an injection mold for the manufacture of shrinkage test specimens was designed and manufactured. The character of dimensional stability and shrinkage in the main and minor directions was verified on these test specimens. In the following part, the test samples were subjected to scanning electron analysis. The results of this analysis show pigment particle size that means the homogeneity of pigments dispersion within the mixture. Lastly, the influence of a colored concentrate presence on the melt index of polymeric materials was tested. Color concentrates have been shown to have a statistically significant effect on mechanical properties, affect colorimetric properties and

dimensional stability. This effect differs slightly from color concentrate to color. A concentration of 3% of the color concentrate can be considered as the optimum concentration with respect to said properties.

Esher Ramakers-van Dorp, Ph.D.

Date of defence: 12. 12. 2019

Supervisor: prof. Ing. Berenika Hausnerová, Ph.D.

Process-Induced Thermal and Viscoelastic Behavior of Extrusion Blow Molded Parts

Abstract

Process-dependent thermo-mechanical viscoelastic properties and the corresponding morphology of HDPE extrusion blow molded (EBM) parts were investigated. Evaluation of bulk data showed that flow direction, draw ratio, and mold temperature influence the viscoelastic behavior significantly in certain temperature ranges. Flow induced orientations due to higher draw ratio and higher mold temperature lead to higher crystallinities. To determine the local viscoelastic properties, a new microindentation system was developed by merging indentation with dynamic mechanical analysis. The local process-structure-property relationship of EBM parts showed that the cross-sectional temperature distribution is clearly reflected by local crystallinities and local complex moduli. Additionally, a model to calculate three-dimensional anisotropic coefficients of thermal expansion as a function of the process dependent crystallinity was developed based on an elementary volume unit cell with stacked layers of amorphous phase and crystalline lamellae. Good agreement of the predicted thermal expansion coefficients with measured ones was found up to a temperature of 70 °C.

Ing. **Daniel Sanétrník**, Ph.D.

Date of defence: 15. 4. 2019

Supervisor: prof. Ing. Berenika Hausnerová, Ph.D.

Optimization of processing of powder injection molding feedstocks prone to phase separation

Abstract

In the last decades Powder Injection Molding (PIM) became an effective technology for a mass production of precise and shape-complex metal and ceramic items. The main issue of PIM process is phase separation occurring during injection molding step. The phase separation causes defects which are detected mostly after final sintering, and thus leading to significant economic and ecological losses. The aim of the thesis is optimization of PIM process and detection of powder/binder separation during/after injection molding step, when the process is still reversible - materials can be regranulated and used again. Direct testing of molded samples, without any additional treatments or knowing an exact composition of used binders, is provided for a broad cast of PIM feedstocks including commercially available ones. The proposed testing method combines scanning electron microscopy with energy dispersive X-ray to detect changes in powder or binder concentrations due to a phase separation, which are then analyzed with a mathematical approach to provide the single variability parameter to quantify the tendency of the particular feedstocks towards phase separation. Further, rheological properties of PIM feedstocks were investigated with the special regard to wall slip effect, which serves as a parameter indicating phase separation during shear deformation. The results reveal the importance of the surface roughness and geometry of the processing tools for the wall slip development; therefore, these parameters should be considered for reliable testing to optimize the molding step of PIM. Finally, the influence of processing parameters such as injection molding temperature and debinding route on the sintered surface structure of PIM parts revealing signs of phase separation was investigated by contactless scanning. The obtained qualitative data were then treated with suitable statistical approaches to quantify the quality of the resulting PIM parts. This thesis provides the contribution to predict and reduce the phase separation of PIM feedstocks, thus positively influencing the effectivity of the PIM process.

Ing. **Pavel Stoklásek**, Ph.D.

Date of defence: 27. 6. 2019

Supervisor: doc. Ing. Miroslav Maňas, CSc.

Influence of the material cutting technology on their surface properties

Abstract

Material splitting is a technology that has recently been booming. This was mainly due to the growing demands on the accuracy of operations and the efficiency of the entire division process. Mechanical methods of cutting, both chip and nonchip, are known for a long time. However, these methods have their limits - in most cases they only allow straight cuts. New technologies, referred to as unconventional technologies, including laser, plasma, or water jet cutting, make it possible to realize slices of complex shapes, at high speeds and with relatively high precision. In many cases, especially in the case of thinner materials, the produced parts do not require any further machining. In addition to 2D cutting intricate shapes, new methods allow even very complex 3D character cuts. With regard to cutting speed, these methods represent significant qualitative and quantitative advances. In order to assess the suitability of using unconventional methods for different applications, it is necessary to know the accompanying phenomena, including in particular the influence of material properties near the cutting line and the quality of the cutting surfaces. The study of these phenomena is one of the main goals of the dissertation work.

Ing. **Filip Tomanec**, Ph.D.

Date of defence: 24. 9. 2019

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

The development of composite orthopedic devices

Abstract

This dissertation thesis deals with the topic of external fixators for the healing process of long bone fractures of lower extremity. Nowadays, the most important disadvantages in term of state of the art are high weight, X-ray impermeability during the surgery and too difficult adjustability of external fixator. During the thesis preparation, the research of this topic has been proceeded from the biomechanical, material and engineering point of view. Further, the individual goals have been established directionally to solve different disadvantages, designed osteosynthesis external fixator using composite material, the unified test has been created. This test serves as a complex and established method of the new fixator design evaluation with the analytical and experimental method application, using deformation analysis, external fixator and composite samples loading during the cyclic tests and gradual loading by the pressure. Results of the unified test indicate, that the new fixator design from

the perspective of stress tests of unified method is convenient for the attestation process of this orthopaedic product. These results also confirm that the problems defined from the surgeon perspective are minimized. The last important finding is an application of this new unified testing method, that can be used even for another fixator development in the future.

1.2 Faculty of Management and Economics

Degree Programme: ECONOMICS AND MANAGEMENT

Degree Course: Management and Economics

Ing. **Barbora Bouchalová (Haltfofová)**, Ph.D.

Date of defence: 12. 12. 2019

Supervisor: doc. Ing. Michal Pilík, Ph.D.

Geocrowdsourcing as a tool for improving the inhabitants' quality of life in the municipalities of the Czech Republic

Abstract

The dissertation thesis deals with the problematics of geocrowdsourcing applications for reporting civic issues and non-emergency problems occurring in municipalities. Its main goal was to identify key factors that influence the success of implementation and use of these applications. To fulfil this goal, three sub-objectives have been defined. The first one was to determine the costs and benefits of implementation and use of geocrowdsourcing applications in municipalities in the Czech Republic. The second sub-objective was to identify the critical success factors (CSFs) of the implementation and use of geocrowdsourcing applications in the Czech municipalities and to specify which of these factors are the most important ones. The third sub-objective was focused on defining the practical implications of research findings for the implementation and use of geocrowdsourcing applications in municipalities in the Czech Republic to streamline the process of implementation and use of geocrowdsourcing applications in Czech municipalities and taking into account the need to improve the quality of citizens' life.

Nguyen Ngoc Tan, Ph.D.

Date of defence: 25. 6. 2019

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

The relationship between knowledge management and organisational performance, mediating role of innovation: the case of public universities in Vietnam

Abstract

Over the past decades, knowledge management (KM), a new discipline of study, has drawn a growing number of researchers worldwide who produced numerous publications and conducted various researches in this field. Together with human resource management, KM is considered a source of competitive advantages for any organisation wishing to achieve its institutional goals and perform better. Meanwhile, higher education institutions, deemed a knowledge enterprise and the main instrument of society for the constant pursuit of knowledge, surprisingly has not made KM a high priority in their agenda. They are now at the forefront of changes. The challenges that they face urge them to incorporate knowledge management practices in order to help them enhance their functions and be more competitive and transparent. There is growing recognition that knowledge management can enable higher education to evolve more smoothly to a highly interactive and dynamic educational environment. In Vietnam, while private universities are mostly newly founded and active in the new time of country's integration path, public institutions seem to be marginalized and slow in response to the change of the market. These institutions, more than ever, are in need of an integrative discipline for studying, researching and learning about the knowledge assets - human intellectual capital and technology. Research on knowledge management that helps promote performance efficiency and innovation in public universities of Vietnam, however, is still an untapped area.

Pham Nhat Tan, Ph.D.

Date of defence: 12. 12. 2019

Supervisor: doc. Ing. Zuzana Tučková, Ph.D.

Green human resource management and corporate environmental performance in the hotel industry

Abstract

The rising public anxiety for environmental issues has stimulated the research working on green policies, especially in human resource management strategy. Despite the theme of green human resource management (GHRM), defined as environmental management-oriented human resource management strategy, has been outspreading recently, previous publications have so far undeveloped (1) the indirect effects of employee environmental commitment and organizational citizenship behavior for the environment (OCBE) towards the connections between GHRM practices and corporate environmental performance; (2) the interactive influences of among GHRM practices (two- and three- way interaction effects) on corporate environmental performance; and (3) GHRM practices applied for developing environmental sustainability in the hotel industry. By extending Ability-Motivation-Opportunity and social exchange theories, this work aims to bridge such research gaps via examining a new conceptual framework, which explores the direct, indirect and interactive roles of GHRM practices (e.g., training, performance management, and employee involvement) to organizations' environmental performance.

Quyen Phu Thi Phan, Ph.D.

Date of defence: 13. 12. 2019

Supervisor: doc. Ing. Michal Pilík, Ph.D.

Exploring social eWOM intention in social commerce environment: Individual-level Culture Values as a Moderator

Abstract

The growing popularity of social networking sites has made the experience of consumers on social commerce environment different from other contexts, as the consumers can share or reposted about a product or a brand. A latest version of electronic word of mouth, called social electronic word of mouth (social eWOM), has become popular for researchers and people from practice, too. Social eWOM occurs when consumers explore any information

related to brands/ products exchanged among the users of social networking sites. The distinct social nature of social networking sites indicates an interesting and proper context for examining eWOM behaviours. Moreover, little research has been published addressing the factors influencing social eWOM intentions. Adopting the stimulus - organism - response (S-O-R) framework and Service - Dominant theory, this study explored the impacts of social commerce characteristics on social eWOM intentions in an integrative framework: stimulus environment (social commerce characteristics), consumers' internal state (trust, customer experience, perceived value co-creation), and response (social eWOM intention). In addition, the moderating role of individual cultural value (individualism and uncertainty avoidance) related to the relationship between customers' internal state and social eWOM intentions was examined.

Degree Programme: ECONOMIC POLICY AND ADMINISTRATION

Degree Course: Finance

Florin Aliu, Ph.D.

Date of defence: 17. 6. 2019

Supervisor: doc. Ing. Adriana Knápková, Ph.D.

Business Valuation of the Companies Listed on the Prague Stock Exchange and V4 Countries

Abstract

The work primarily estimates the intrinsic value of the companies listed on the Prague Stock Exchange as an important price signals delivered in the stock market. Determining the estimated intrinsic value of the companies listed in the stock exchanges is essential evidence not just for mergers and acquisition, but also for banks, suppliers, customers, investors, shareholders and employees on the current and future outlook of the company. There are many unclear inputs standing on the general theoretical concepts and practical applications that lie within the valuation of publicly listed companies. The results of the study try to give small indications on an overall complex issue of the valuation process.

Mehmet Civelek, Ph.D.

Date of defence: 17. 6. 2019

Supervisor: prof. Ing. Jaroslav Belás, PhD.

Credit Risk Management in Small and Medium-sized Enterprises (SMEs)

Abstract

Information asymmetry and credit risk underlie in the reasons of credit access obstacles of Small and medium-sized enterprises (SMEs). In this regard, one of the purposes of the thesis is to find out constraints that stem from information asymmetries between firms and banks and also credit risks of SMEs in the bank credit access of Turkish SMEs. In order to solve asymmetric information and credit risk problems, the thesis aims to discover some factors that can influence bank lending decision to provide an easier access for those firms. Some methods that are based on hard data can solve the credit access issues. However, the nonexistence of audited financial statements and lack of complete and timely information provided by SMEs cause troubles for banks to evaluate SMEs' creditworthiness by financial indicators. To cope with this issue, the thesis suggests some variables that are based on soft information such as some attitudes of businesses and relationship between banks and firms. In this respect, the thesis supposes that by signaling their competencies and behaviors that are related with entrepreneurial orientation, SMEs can reduce banks' concerns about their credit risks in relationship lending.

Ing. **Zuzana Crhová, Ph.D.**

Date of defence: 17. 6. 2019

Supervisor: prof. Dr. Ing. Drahomíra Pavelková

The Impact of Knowledge Sharing on Performance of Organizations

Abstract

Changes in the business environment are coming increasingly faster. Thus, knowledge sharing among employees appears to be more important than it was previously, as it can help organizations to improve responses to changes and increase their innovativeness and perfor-

mance. Therefore, the thesis deals with the topic of knowledge sharing and its impact on performance of organizations. Considering different views on performance of organizations, the performance is defined as innovativeness, perceived performance and financial performance in this thesis. This thesis employs qualitative and quantitative research methods to answer research questions and achieve the main goal. The main goals is to identify benefits of knowledge sharing, propose the method of measurement of knowledge sharing extent and its benefits, and identify the relationship between the extent of knowledge sharing and performance of organizations defined as the innovativeness, perceived performance and financial performance.

Ing. Mgr. **Zuzana Fišerová**, Ph.D.

Date of defence: 28. 2. 2019

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

Indebtedness of Individuals

Abstract

The dissertation focuses on the indebtedness of individuals and the situation where individuals (consumers and entrepreneurs) are unable to fulfil their payment obligations. In the Czech Republic, there were radical changes in the area of insolvency in 2008, when the so-called insolvency law came into force. This law enabled individuals to resolve their excessive indebtedness by the institute of personal bankruptcy, which does not result in their liquidation. The main goal of the dissertation is to find, on the basis of theoretical knowledge and extensive research on insolvency proceedings, the common characteristics of the indebtedness of individuals, to describe the dependence of indebtedness of individuals on the time before declaring bankruptcy and to describe the proces of indebtedness in a comprehensive manner. The basic intention is based on dynamic developments in the area of indebtedness of individuals and the efforts to solve their over-indebtedness, which causes changes of key actors involved in the insolvency process (borrower, lender), but it problematics also affects other economic subjects and, on a wider scale, changes the climate of the whole economy.

1.3 Faculty of Multimedia Communications

Degree Programme: VISUAL ARTS

Degree Course: Multimedia and Design

Mgr. **Barbora Baronová**, DiS, Ph.D.

Date of defence: 5. 12. 2019

Supervisor: doc. MgA. ArtD. Jana Janíková

Women on Women. Disclosure of the Creative Practice of the Czech Women Film and Literary Documentary

Abstract

PhD thesis under the title Women on Women: Disclosure of the Creative Practice of the Czech Women Film and Literary Documentary explores the creation of the documentary content produced by women in the context of the Czech film and literary documentary. Submitted work examines specific phases and variables of the creative processes realized by women documentarians, having different professional background, various opinions, and values, moreover employing diverse creative methods. Analysis itself, set as the main component of the theoretical PhD thesis, is rooted in the practical, creative part of the PhD thesis. The book, comprising of twenty-eight interviews with twentynine film and literary women documentarians, has become the primary source of knowledge within this PhD thesis. Applying their subjective perspective, its women respondents are discussing topics such as context within the content is produced, documentarists' background and their self-reflection, intentions and motivations behind the act of creation, topic and respondent selection. They are explaining their relationships with their subjects, approach to ethics, working procedures, important aspects of the documentary practice such as censorship, engagement, and therapy, as well as funding, and the role of the institutions. Furthermore, they are examining the fact of being a woman in relation to feminism, gender, collaboration, motherhood, and employment.

MgA. **Eliška Blažková**, Ph.D.

Date of defence: 19. 6. 2019

Supervisor: prof. Mgr. Pavel Dias

Bezalel Academy of Art and Design in Jerusalem. Historical Development with a Focus on the Teaching of Photography

Abstract

This thesis focuses on history, development and the current state of affairs at the Bezalel Academy of Art and Design in Jerusalem, Israel, taking into accounts the status of Art Photography not only at the Academy itself but in the Israeli society and culture in general. Due to the specific nature of the Israeli society and culture and its perception of art, the photography itself wasn't originally accepted as an adequate and independent field of art, but merely as an instrument of propaganda and a documentary. The specific part of the thesis presents the interviews with the three illustrious personalities of the Academy: Yehuda Bacon, a painter and teacher of Czech origin; Hanan Laskin, the founder of the independent department of photography at Bezalel; and Yosaif Cohain, one of the most prolific educators in the field of Art Photography in Israel.

MgA. **Michal Jakubec**, Ph.D.

Date of defence: 5. 12. 2019

Supervisor: doc. MgA. ArtD. Jana Janíková

The importance of visual communication to the activity of the creative center

Abstract

The dissertation focuses on the issue of the uniform solution of corporate and visual communication of the Center of Creative Industries and Business in Zlín and its influence on the systematic building of the brand. When building the UPPER brand it is necessary not only to analyze the visual analysis of the segment but also to thoroughly investigate the environment and the conditions in which the creative center is located and functioning. These conditions have an impact on the potential and potential for brand development in the creative industries. A comprehensive visual communication applied both offline and online is important for the good functioning of the creative center. By adhering to visual unity and defined rules, it is possible to create a memorable and functional brand that will have a positive

impact not only on the target group but also on the internal environment and the employees of the Center of Creative Industries and Business UPPER.

doc. MgA. **Kristýna Petříčková**, Ph.D.

Date of defence: 19. 6. 2019

Supervisor: doc. Mgr. Ivan Titor

Traditional Folk Clothing in Blatnička and Blatnice pod Svatým Antonínkem in the subregion of Uherskoostrožsko

Abstract

influence of manufacturing and industrial textile production affecting the appearance of traditional clothing. Next part deals with the typology of garment parts of traditional costume, as well describes types and developmental variants of male, female and child traditional costume. For the identification of the costume, attention is also paid to geometric embroidery on the cut-out, which is characteristic for the subregion of Uherskoostrožsko. Its methodological record has not been published yet. The conclusion is devoted to the costume reconstruction methodology, which is an important tool for understanding of traditional clothing. The aim of the thesis is to record new knowledge about folk clothing culture, which are beneficial not only for science and pedagogy, but can also be a suitable inspirational platform for the creative and textile industry.

MgA. **Tomáš Polenský**, DiS., Ph.D.

Date of defence: 5. 12. 2019

Supervisor: doc. MgA. Libor Nemeškal, Ph.D.

Creative aspects of so called talking heads

Abstract

In my dissertation called Creative Aspects of So-called Talking Heads in Documentary Film I want to define the so-called talking head as an expressive tool of documentary cinema. I would like to defend the talking head as a creative instrument of the director of audiovisual

work and show creative aspects of working with the talking heads based on theoretical reflection and practical experience. In the theoretical part I define the talking head. Furthermore, I present a unique theoretical work of Vít Janeček called Dramatics of Talking Head. In the last part I deal with the aspects of talking head, which form the basic thematic areas for further theoretical reflection. The research part consists of semi-structured interviews with contemporary prominent Czech documentary filmmakers such as: Bára Kopecká, Petr Jančárek, Tomáš Doruška, Ivo Bystřičan, Apolena Rychlíková, Martin Kohout, Vít Klusák, Lukáš Kokeš, Helena Třeštíková, Jan Gogola and Miroslav Janek. Their edited testimonies create a complex overview of creative aspects of talking heads. It covers key aspects from respondent selection, preparation and conducting interviews through cinematography and post-production. The creative output of my dissertation is the film Unsilenced Voices of Beslan (2018, D: Tomáš Polenský). During the work on this film I examined practical aspects of using the talking heads as a creative tool of a director. Crucial part of this movie consists of testimonies from the victims of the 2004 terrorist attack.

1.4 Faculty of Applied Informatics

Degree Programme: ENGINEERING INFORMATICS

Degree Course: Automatic Control and Informatics

Ing. Jan Antoš, Ph.D.

Date of defence: 11. 9. 2019

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

Predictive Control of Processes with Utilization of Artificial Intelligence Elements

Abstract

Predictive control is a method of control process which is suitable for different types of systems. This method is based on the utilization of prediction of the future behaviour of a system and its optimization. A model of this system is mainly used for prediction, hence it is crucial to choose the model properly and set its parameter so that it describes the behaviour of the system as precisely as possible. Another advantage of the predictive control is the possibility

to directly apply constraints within a controller. The aim of this work is the application of some elements of artificial intelligence in proper fields of predictive control. It is focused especially on the utilization of simple evolutionary algorithms in the optimization process as well as using neural networks as models of the systems. It has been shown that, besides classical optimization algorithms, it is possible to apply simple evolutionary algorithms with similar computational demands depending of the problem type and accordingly setting the algorithm. The process of choosing proper systems with slow dynamics, their derivations of mathematical formulas and the methodology of model creation in the form of scalable neural networks is discussed further. This approach can be convenient for controlling of systems which are difficult to be mathematically described or for systems whose description is not known at all. The possibility of application of these models to real systems, the definition of necessary conditions and the requirements for their applications are discussed as well.

Degree Programme: ENGINEERING INFORMATICS

Degree Course: Engineering Informatics

Ing. **Pavel Beňo**, MSc., Ph.D.

Date of defence: 12. 12. 2019

Supervisor: prof. Dr. František Schauer, DSc.

Cloud computing solutions and security of EU remote interactive laboratories network

Abstract

The submitted work deals with the problems, which has faced the Consortium REMLABNET of remote laboratories Tomas Bata University Zlin, University of Trnava in Trnava and Charles University in Prague after inaugural and habilitation processes and 4 PhD theses with the subject matter of individual remote laboratories, work on administration system REMLABNET and its introduction into teaching process of natural sciences since 2006 until present. The submitted work deals with these open and unsolved problems and mainly concentrates on management system of remote laboratories REMLABNET and its embedding into the cloud system. Especially in focus were cloud's computation mecha-

nisms, security testing and verification of its functioning by testing optical routes, penetration testing and introducing special cloud services. The thesis also brings solutions, contributing to the current trend of federalization of world and EU remote laboratories. The thesis also briefly describes the building trajectory of both the joint laboratories, and the contribution of the present thesis since 2011 of its start, till present with outlook for its future development.

Ing. **Peter Janků**, Ph.D.

Date of defence: 11. 12. 2019

Supervisor: doc. Ing. Bronislav Chramcov, Ph.D.

Algorithm for Fast Fire Detection in Video Stream

Abstract

This thesis deals with algorithms of fire detection in a video stream. Each unmanaged fire or emergency event caused by the fire has a significant potential to inflict extensive damage on a property or human lives. Moreover, widely used standard fire detectors have some principle limitations, and therefore their usage is restricted in specific scenarios. Especially in industrial areas, processes similar to combustion or processes containing combustion can be found. Even if the development of the fire-detection computer vision algorithms is well-published, there are no suitable algorithms for fire-detection in the video stream in real-time. This thesis is aimed to develop a new computer vision algorithm which is suitable for fire detection by using standard surveillance camera. The main result is a new algorithm specification suitable for fire detection in video stream by using simple feed-forward neural network and feature extraction. The special attention is devoted to decrease the computational complexity and improve the reliability of detection.

Ing. **Zdeněk Malánik**, DCv., Ph.D.

Date of defence: 16. 5. 2019

Supervisor: doc. RNDr. Vojtěch Křesálek, CSc.

Usability of the Artificial Intelligence and Modern Techniques for Securing Computer Systems

Abstract

This thesis is aimed to practical usability of the neural network in computer security application. The main point of this thesis is focused on the small part of neural network inside the user verification process. The neural network represented some intelligent system which might be adapted to specific user characteristic and might be usable for the smart reconstruction and identification users. Other part of this work deals with the next potentially usability of smart neural network. One of these parts includes the cipher algorithms based on the neural network. Other one represented the new angle of view onto user verification. The commonly base method use only one-time user verification. But the systems included some intelligent behaviour, might periodically checking the user identity. Obviously not by providing the username and some password, but by processing the statistics analyses of current user. These systems are able to detect the user- switching without the correct logout and login procedure.

Ing. **Tomáš Martínek**, Ph.D.

Date of defence: 9. 9. 2019

Supervisor: doc. RNDr. Vojtěch Křesálek, CSc.

Diagnostic Methods for Percolation Threshold Determination of Ultra-Thin Tungsten Layers

Abstract

Main goal of this work is to determine percolation threshold of ultra-thin tungsten films deposited by radio-frequency magnetron sputtering. Nanoscale characterization of these films was done by microscopic techniques. Electrical DC surface conductivity, dielectric constant using THz-TDS, optical transmittance, UV/VIS spectrophotometry and luminescence spectra were measured. Electrical percolation threshold of these films was calculated from results of these measurements at (1.79 0.28) nm.

Ing. **Lucia Mrázková**, Ph.D.

Date of defence: 30. 9. 2019

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

The Assessment of the Soft Targets Security

Abstract

The dissertation describes a proposal of methodology for the assessment of objects belonging to the group of soft targets. At present, several methodologies are published that formulate procedures for designing measures in the soft target objects, but there is no comprehensive approach linking the relevant design with the evaluation of these objects based on their properties and numerically expressing the resulting security status. The dissertation thesis, therefore, represents a comprehensive and complex way of solution. The purpose of the dissertation thesis is to develop and present a complex way for soft targets assessment that respects and is in line with currently available and published methodologies. The methodology for soft targets assessment was confronted during the study and presented to several national as well as international experts at international conferences to gain feedback from the professional community. The methodology for assessing the security of soft targets evaluates the security status of an object based on an assessment of the condition and fulfillment of selected (security) properties of the assessed object.

Ing. **Lukáš Pavlík**, Ph.D.

Date of defence: 25. 9. 2019

Supervisor: doc. Ing. Luděk Lukáš, CSc.

Design of Algorithm for the Determination of Insurance Value from the Perspective of Cyber Security

Abstract

The thesis is focused on the issue of information security from the perspective of insurance against cyber threats. The main part of the thesis is a proposal of an algorithm for determining the insurance value resulting from the impact of selected cyber threats on the organization from the perspective of insurance and its subsequent verification. The proposed algorithm is based on the valuation principle of identified vulnerable elements of the organization and analysis of selected cyber threat scenarios, including determining the most serious

scenario. The output of this algorithm is to determine the financial impact on selected vulnerable elements of the organization that can be used to calculate the insurance value. The expression of potential impacts of cyber threats is also based on an analysis of the organization's information environment, statistical indicators, and probabilistic models.

Ing. **Petr Svoboda**, Ph.D.

Date of defence: 12. 12. 2019

Supervisor: doc. Ing. Luděk Lukáš, CSc.

A Design of an Algorithm for the Implementation of Virtual Simulators into Training in the Private Security Industry

Abstract

This dissertation deals with the implementation of virtual training simulators for the preparation of the personnel of the private security industry. The first part of the paper is focused on an analysis of the current trend of using training simulators in the field of the private security industry, and in both the army and the police force in the Czech Republic and abroad. The experimental part is devoted to accomplishing the objectives of the dissertation. Specifically, the main objective of the paper - a design of an algorithm for the implementation of virtual simulators into training in the private security industry - is fulfilled by means four sub-objectives. The first is to design and creation of a support tool to facilitate the implementation of object types, scenarios, attributes and actions into a virtual simulator. The second sub-objective focuses on the specification of the algorithm for the use of the proposed tool. The third objective is aimed at designing algorithms facilitating the specification of requirements for the implementation of object types, scenarios, attributes and actions into a virtual simulator and the fourth objective is aimed at verifying the proposals.

1.5 Faculty of Humanities

Degree Programme: PEDAGOGY

Degree Course: Pedagogy

PhDr. **Barbora Petru Puhrová**, Ph.D.

Date of defence: 6. 6. 2019

Supervisor: doc. PaedDr. Jana Majerčíková, PhD.

The parent as an agent in pupil's homework preparations

Abstract

This dissertation concerns pupils' homework at elementary school level, i.e. aged 6 to 10 years old. The focus of interest is the pupil's parent. Existing theoretical findings present the relationship between the school and the modern family in the context of giving the parent an active role in the pupil's homework preparations. The terms 'agent' and 'agency' are commonly used in scientific research. The research objective was to discover and explain the role of a parent, mainly the mother, as an agent, as well as identify the attributes of agency in the pupil's homework preparations. The qualitative research was conducted in three stages over a two-year period, initially through seventeen semi-structured interviews with predominantly university-educated parents of elementary school pupils, followed by observation of homework preparations in three families, and finally through semi-structured interviews with three intentionally selected mothers of elementary school pupils. The data were analysed in the context of a paradigm model of grounded theory using axial coding. The research uncovers the internal perspectives of the parents in the study and in these perspectives, the agency of the parent, which the mother-agent perceives intensely, manifests itself in their approach to homework preparation. The conditions of household management including the variables of time, space, motivational monitoring and control of the child's and parent's emotions, determine the style and quality of homework preparation. The parent, in homework preparation, seeks as an agent to achieve certain changes. The chosen style and strategies are directed towards the child being successful in school and the parent's satisfaction, which derives from the energy expended and the effort displayed through their agency in the child's homework preparation.

2 DEFENDED HABILITATION THESES

In 2019, 5 habilitation theses were defended: 2 at the Faculty of Technology, 1 at the Faculty of Management and Economics, 1 at the Faculty of Multimedia Communications and 1 at the Faculty of Applied Informatics.

2.1 Faculty of Technology

Course: Technology of Macromolecular Compounds

doc. **Anita Białkowska**, Ph.D.

Appointed with effect from: 1st November 2019

Nonisocyanate Condensation Polyurethanes: Preparation, Properties Evaluation and Applications

Abstract

Due to their versatile structure and excellent mechanical, physical and chemical properties, polyurethanes are widely used in various fields of applications mainly as foams, elastomers and coatings. However, the use of dangerous compounds (mainly isocyanates) for their synthesis associated with the recycling problems have encouraged researchers to develop new ways to synthesize more environmentally friendly and biodegradable polyurethanes.

So far, most of the conducted studies concerned the synthesis of nonisocyanate polyurethanes (NIPUs) by reacting cyclic carbonates and diamines. Moreover, in the last decade, intensive effort was devoted to the synthesis of isocyanate based polyurethanes (PUs) and nonisocyanate polyurethanes (NIPUs) from natural resources such as vegetable oils and natural fats. These compounds allow to obtain cheaper, biodegradable and environmentally friendly polymers, using the so called green-technology. The idea was to carry out processes using the solvent-free method in accordance with the principles of sustainable development. The present work deals with the preparation of new nonisocyanate segmented polyurethanes, based on typical oligoetherols (polyoxypropylene triols or polyoxybutylene diols), urea, formaldehyde and phenolsulfonic acid. Oligomeric carbamates containing flexible segments (FS) were prepared by reacting typical oligoetherols. However, the reaction between urea, phenolsulphonic acid and formaldehyde led to the formation of oligomeric compounds containing the hard segments (HS). The nonisocyanate segmented polyurethanes were prepared

by condensation reaction between oligomeric compounds containing FS and HS. Investigations were also carried out on NIPUs aiming at improving their mechanical strength and thermal resistance by replacing part of the phenolsulfonic acid with another acid such as hydroxybenzoic acid or naphthalene sulfonic acid. The optimal conditions for the synthesis of new NIPUs having the best performance properties were determined depending on the raw materials used in their synthesis.

The mechanical properties and sorption/desorption of water vapour were evaluated for NIPUs containing different amounts of FS and HS. Moreover, the structure of prepared oligomeric compounds and NIPUs was analysed by different techniques such as Nuclear Magnetic Resonance (NMR), Fourier Transform Infrared Spectroscopy (FTIR), Differential Scanning Calorimetry (DSC), Scanning Electron Microscope (SEM) and Dynamic Mechanical Analysis (DMA).

The chemical structure of obtained oligomeric compounds containing FS and HS as well as segmented condensation polyurethanes were confirmed by NMR and FTIR. In addition, DSC and DMA analyses demonstrated that the new synthesized nonisocyanate polyurethanes showed a wide range of utilization temperature. They were frost resistant as well as retained their elastomeric

character at very high temperatures. The degree of phase separation within the segmented structure of the NIPUs affected the mechanical properties, which were similar to the conventional isocyanate-based polyurethanes (PUs).

All nonisocyanate polyurethanes obtained from oligoetherols, urea, formaldehyde and different acids (phenolsulfonic acid, phenolsulfonic acid with hydroxybenzoic acid or phenolsulfonic acid with naphthalenesulfonic acid) having an ionomeric nature induced by sulfonic groups, exhibited segmented structures.

Polyurethanes obtained from water dispersions were in the form of microporous membranes. However, they can yield solid homogeneous membranes when directly prepared from the raw material mixture. The microporous structure and ionomeric nature of NIPU membranes imply their use as the leather-like materials, filling agent for topographic skins and selective membranes.

Moreover, prepared segmented condensation NIPUs were successfully used as toughening agent for base epoxy resin and epoxy/montmorillonite nanocomposites with the formation

of an interpenetrating polymer networks structure in comparison to conventional polyurethanes. Maximum enhancement of impact strength and critical stress intensity factor values were obtained by the hybrid composition containing 10% NIPU and 1% nanoparticles. The biodegradability of synthesized segmented condensation NIPUs has also been considered in the present study with aerobic bacterial strains and successfully conducted. Obtained results confirmed, that the biodegradation occurred in the urea or urethane groups, as evidenced by significant decrease in the glass transition temperature of the hard segments. Hence, the acceptable physical and mechanical properties of obtained NIPUs combined with their biodegradability confirm that these new polyurethanes can be used as leather-like materials, selective membranes, modifier for brittle polymers as well as in applications where biodegradation is of major concern.

Course: Tools and Processes

doc. Dr.-Ing. **Radek Stoček**

Appointed with effect from: 1st November 2019

Future trends in experimental tools for complex description of fracture behavior of elastomers

Abstract

The aim of the habilitation thesis is to describe the future trends in experimental tools describing the fracture behavior of rubber materials from the energy point of view. The work also focuses on contribution to the establishment of efficient, however highly exact complex methodology with exact definition of experimental tools, determining the fracture processes with respect to the real loading conditions, applied on rubber products in practice. The content of the thesis should summarize the fracture processes and mechanisms occurring in rubber, respectively in rubber products and it introduces application of experimental equipment developed by the author of the inaugural dissertation with respect to loading conditions used in service life. The complex established process leads to accelerated prediction of rubber matrix fracture fatigue lifetime from the determination from a minimum energy requirement for the rupture of chains up to maximal critical energy of unstable rupture of complete rubber matrix. The thesis is covering the phenomena from theoretical as well as experimental point

of view. The main goal of this thesis is to provide unique view into the fracture mechanics, to introduce newly developed experimental tools and finally to utilize the methodology of the complex rubber fracture investigation on the highest level.

2.2 Faculty of Management and Economics

Course: Management and Economics

doc. Ing. **Petr Novák**, Ph.D.

Appointed with effect from: 1st February 2019

Management of Overheads in Terms of the Cost Behavior and

Variability of Cost Groups in Manufacturing Enterprises

Abstract

The habilitation thesis deals with the issue of management of overheads in terms of their behavior and variability of cost groups in manufacturing companies in the Czech Republic. It summarizes the quantitative and qualitative research results. The aim of the thesis is to analyze the current approach of manufacturing companies to management of overheads and how companies reflect new knowledge and approaches of cost behavior in the management and cost systems used and thus contribute to deepening the knowledge of behavior of overhead costs depending on selected factors. Quantitative research was conducted in 2014-

2015. It focused on the style and level of cost management in manufacturing companies with the accent on overheads, their monitoring, perception and assessment. Subsequently, the qualitative research was carried out using case studies in selected manufacturing companies. It was aimed at exploring and determining the cost behavior dependency and checking the variability of overheads, including their regression modeling, according to various factors and beyond the standard production volume. The partial objective was also to test a cost survey model to determine whether the overheads are rigid and show signs of asymmetric behavior towards changing factors. The habilitation thesis provides a comprehensive overview of the overheads management, their adequate reflection in cost systems, assessing overheads from the view of their behavior and level of variability beyond the traditional view of production volume. It focuses on looking for ways to assess asymmetric cost behavior

that could be described by cost models and that could be used to verify the causal relationships of cost rise as well as for the purpose of forecasting and cost planning. This thesis introduces new and not yet extended approaches to cost management and cost assessment in the Czech Republic. It is based on the indepth analysis of theoretical, and above all, foreign scientific and professional works and monographs. The current state of knowledge thus confirms the contribution of this topic to the Czech environment and also shows a possible direction of further research.

The main findings of the research confirmed the persisting traditional approach to managing and assessing cost variability, reflecting the production volume as the only factor. There were tested multiple regression analyses to design regression models within specific case studies, and dependencies of different overhead cost groups on defined factors were identified. This confirms that cost behavior can also be judged from the view of non-traditional factors. At the same time, the asymmetric behavior was demonstrated for some groups of costs in relation to the factors considered.

Based on this work, it will be possible to continue with further research of overhead costs behavior. However, it will also be possible to look for and assess other factors influencing the source and behavior of overheads.

2.3 Faculty of Multimedia Communications

Course: Multimedia and Design

doc. Mgr. Akad. mal. **René Hábl**

Appointed with effect from: 1st May 2019

Micromegas (Set of paintings from 2001 to 2011)

Abstract

The subitted set of pictures originated from 2001 to 2011. It is a cycle that does not have a chronological order, the sequence of images is variable. At certain interpolation points, the images meet or eventually follow. Their formation was not conditioned by systematic one-side solutions, so they can be perceived as solitaires, without continuous succession.

2.4 Faculty of Applied Informatics

Course: Machine and Process Control

doc. Ing. **Pavel Hrnčířik**, Ph.D.

Appointed with effect from: 1st June 2019

Knowledge-based Monitoring and Control of Biotechnological Production Processes

Abstract

This habilitation thesis deals with the methods used for the design of knowledge-based monitoring and control of biotechnological production processes. These processes require special treatment with respect to the complexity in biochemical reactions which make the design and construction of reasonably complex and practically usable mathematical models rather difficult. Additional complexity arises from the lack of industrially viable sensors for on-line measurement of key process variables. The knowledge-based control systems using tools from the field of artificial intelligence represent one of the suitable approaches for the overcoming of the above mentioned limitations for its ability to utilise effectively both quantitative and qualitative knowledge about the controlled process. This approach is shown in practice using 3 different case studies of knowledge-based control (production processes of provitamin D₂-ergosterol, biopolymer PHA and antibiotics Nystatin).

3 QUALIFYING LECTURES FOR PROFESSORSHIP

3.1 Faculty of Technology

Course: Tools and Processes

prof. Dr. Ing. **Vladimír Pata**

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 4th June 2019

Appointed with effect from: 28th November 2019

Modern ways of assessing the roughness of engineering surfaces based on mathematical statistics

Abstract

In current scientific literature, the term "mathematical assessment of roughness of technical surfaces" can be considered as relatively low quoted. This term is part of the "Surface Integrity" assessment, where it forms the basic, yet relatively, small part of this global concept. This is probably due to a "somewhat obsolete approach" to his assessment. The present thesis deals with the refinement of the term "surface roughness" based on application of technological operation and mathematization of the resulting roughness on the basis of modern statistical methods including elements of neural networks, or fractal analysis. As a key concept, surfaces are divided into surfaces with homogeneous and heterogeneous roughness and methods of their evaluation. A wide range of modern statistical tools based on discriminatory or cluster analyses are used, and there is also the application of classical theory of hypotheses, but in the context of corresponding silofunctions. The thesis also outlines the way of evaluation of surfaces using the Hausdorff-Besicovitch fractal dimension, the cover dimension. 4

Finally, the use of Rosenblatt perceptrones is described to construct a neural network with a single hidden layer addressing the self-discrimination of roughness of heterogeneous surfaces.

All parts of the thesis presented have been published in journals contained in WOS and SCOPUS databases, or have been part of published patent files and stored in the "Database of patents and utility models" in the national database section.

3.2 Faculty of Management and Economics

Course: Enterprise Management and Economics

prof. Ing. **Beáta Gavurová**, PhD., MBA

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 4th June 2019

Appointed with effect from: 28th November 2019

Current problems of economy and healthcare system management

Abstract

Slovak healthcare is as well as the pension system one of the most risky sectors in terms of the long-term sustainability of public finances. The financial health balance in the coming decades will also negatively affect the demographic aging process. It will define higher demands on healthcare providers, as well as the structure and extent of the health services. This will irreversibly affect the economic and management processes in healthcare facilities. Many expert studies evaluate several issues in the area of economy and management of the healthcare system, centered on processes, measurement systems and data platforms. Their solution pursues a common goal - the pressure on higher efficiency of healthcare facilities. Slovak hospitals are considered to be the weakest segment of health care. There are long-term processes are financially set to optimum performance. State hospitals complain of ineffective management, lacking adaptive quality and efficiency assessment systems, lack of strategic management and planning, efficient purchasing of medical technology, quality pricing and standardization etc. As some experts agree, to ensure the financial sustainability of healthcare system and to improve population health, the processes of measuring the quality and efficiency of the provided healthcare should be applied at the level of individual providers and the information flows between providers and the health insurance companies should be clarified. To fulfill this objective, it is also necessary to eliminate the problems in the data collection system, to improve the quality of information on population health and the functioning of health care and to increase the investment in primary prevention and education as well as looking for options to eliminate the inefficiency of processes in the health care system. These aspects are linked to the research dimensions presented by the author

as selected problematic areas of the economy and health care system management in Slovakia. These are focused on strategic management processes in hospitals, measurement and performance management processes in hospitals, economy and management of selected treatment processes, support for decision-making processes in the field of diagnostics and treatment, as well as measurement of the quality of the healthcare system by a prominent method - the concept of avoidable mortality. The lecture also presents other computational multidimensional analyzes in the health system. A special part of the lecture is a presentation of the significance of the research topic for its subsequent development and the creation of a multidisciplinary platform, as well as several benefits for the pedagogical process and the practice.

prof. Ing. **Boris Popesko**, PhD.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 6th November 2018

Appointed with effect from: 23th May 2019

Transformation of Budgeting Systems – from Traditional Budgets to Performance Management Systems

Abstract

The aim of the lecture is to introduce the issue of transformation of budgeting systems which is going on in corporate practice these days. It is typical for its transition from traditional fixed budgets to alternative budgeting systems based on flexible plans and features of performance management systems. Foreign studies show that even though this transformation is very often described in literature sources and the imperfections of traditional systems are taken into account by corporate practice the transformation rate of the change from traditional budgeting systems to the performance management ones is not too high in corporate practice. Moreover, the lecture covers the topic of specifics of transformation of budgeting systems under conditions of the Czech Republic. This issue is also the subject of author's research activities which are presented in his work.

The introductory part of the lecture deals with a classical budgeting theory and presents traditional approaches to budget setting and its evaluation, as being a significant tool of corporate management. In the following part, the imperfections of traditional budgeting are discussed. These have been subjects to an intensive academic discussion in the last two decades.

In the next part of the lecture, alternative approaches to budget settings are presented. This part also focuses on the ways business practice eliminates the imperfections of traditional budgets mentioned by the application of innovated methods based on the process of division decentralisation as well as the application of performance management systems. The final part of the lecture then introduces the author's research results which came out of a questionnaire survey in 2014.

prof. Ing. **Rastislav Rajnoha**, PhD.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 6th November 2018

Appointed with effect from: 23th May 2019

Strategic Performance Management of Companies and Multinational Corporations in the Context of Globalization and Sustainability

Abstract

The lecture focuses on the importance of the issue of strategic business performance management and measurement in general as well as on its specific application in domestic companies and multinational corporations operating in Slovakia in the context of globalization and sustainability. The concept of traditional financial performance management is extended to the concept of strategic business performance measurement and management. It seems that the traditional concept of strategic business performance management, known as Balanced Scorecard, designed by the American authors Kaplan and Norton, needs to be supplemented and enriched by a number of external factors as well as by incorporating the impact of global processes and phenomena. This assumption proceeds from the general nature of strategic business management, the primary role of which is to take into account internal as well as numerous external factors and global processes worldwide. The importance of this issue is also demonstrated by the results of many recent empirical research studies published worldwide in peer reviewed professional journals.

The lecture presents research conception, methodological procedures as well as selected results of long-term empirical research which the author realized his own vision in the field of strategic business performance management in the context of globalization and sustainability. The author has developed a typological Strategic Business Performance Management and Measurement Scorecard - SBPM SC which represent a set of specific indicators and

tools for the strategic measurement and management of business performance differentiated for various business performance groups as well as for selected industries in Slovakia. Based on SBPM SC the author has found a holistic model of SPMS that is typically used by high-performance enterprises respectively multinational corporations operating in Slovakia. Among several selected external factors, this model takes into account current global phenomena such as explosive IT development, globalization, environmental aspects along with sustainability issues.

The research results offer relevant and interesting implications for manager behaviours, also for public authorities as well as motives for further academic investigation of the strategic business performance management issue in academic community.

3.3 Faculty of Multimedia Communications

Course: Multimedia and Design

prof. MgA. **Petr Stanický**, M.F.A.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 6th November 2018

Appointed with effect from: 23th May 2019

Glass, light, space as an intervention in architecture

Abstract

The thesis deals with the artistic work of Petr Stanický, his relation to the glass as fine art medium and especially his approaches to the interpretation of his visual art works. He passes this concept on to his students in the courses and lectures he teaches at Tomas Bata University in Zlín. In his art works, Petr Stanický focuses on space issues and place in contemporary visual culture and their relationship to architecture, their constant transformation and intermingling.

At the beginning of his art career, he left the purely figural concept of the sculpture and leaned forward to work with geometry influenced by the architectural object. Objects made of glass have become a significant sign of Petr Stanický's work for the last decade. His rich experience in the field of sculpture and 3D objects is handed over to the students of Glass at TBU in Zlín. In addition to trying to teach students to work with material, composition and shape, he also guide them towards future professional practice. Besides the necessary

teaching of the drawing and theoretical reflections, students deal with the material and it also consider practical experience, such as intership abroad, lectures and consultation with contemporary artists and work on real designer projects. Its aim is in particular to educate the generation of artists and designers who will be able to work on the professional scene for artists and designers.

4 IMPORTANT SCIENTIFIC AND SPECIALIZED ASSIGNMENTS

4.1 Projectst financed by the Czech Science Foundation (GACR)

In 2019, 14 projects financed by the Czech Science Foundation were implemented at the TBU in Zlín. Total eligible costs amounted CZK 14,256 thousand for TBU in Zlín in 2019.

4.1.1 Faculty of Technology

Standard projects

GA17-09594S Reduction of biogenic amines content in model systems

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: prof. RNDr. Vlastimil Kubáň DrSc.

Implementation period: 2017 - 2019

Total project cost (CZK thous.): 7 103

Total project cost – TBU (CZK thous.): 5 230

Project cost of TBU in 2019 (CZK thous.): 1 652

4.1.2 Faculty of Management and Economics

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 – 2020

Total project cost (CZK thous.): 2 940

Total project cost – TBU (CZK thous.): 2 940

Project cost of TBU in 2019 (CZK thous.): 0

GA17-13518S Determinants of budgeting and performance measurement systems design and impact of these systems on organizational behavior and organizational perform

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: doc. Ing. Boris Popesko, Ph.D.

Implementation period: 2017 – 2019

Total project cost (CZK thous.): 3 354

Total project cost – TBU (CZK thous.): 1 716

Project cost of TBU in 2019 (CZK thous.): 572

4.1.3 Faculty of Humanities

Standard projects

GA17-04816S The Dynamics of Self-Regulation in Socially Excluded Pupils

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Mgr. Karla Hrbáčková, Ph.D.

Implementation period: 2017 - 2019

Total project cost (CZK thous.): 1 872

Total project cost – TBU (CZK thous.): 1 872

Project cost of TBU in 2019 (CZK thous.): 632

GA19-00987S Blind Spots in Non-Formal Education of Adults in the Czech Republic: Non-Participants and their Social Worlds

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Mgr. Jan Kalenda, Ph.D.

Implementation period: 2019 - 2021

Total project cost (CZK thous.): 3 076

Total project cost – TBU (CZK thous.): 3 076

Project cost of TBU in 2019 (CZK thous.): 850

4.1.4 University Institute

Standard projects

GA17-24730S Novel Magnetorheological Elastomers Based on Modified Magnetic Fillers

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: doc. Ing. Michal Sedlačík, Ph.D.

Implementation period: 2017 - 2019

Total project cost (CZK thous.): 3 873

Total project cost – TBU (CZK thous.): 3 873

Project cost of TBU in 2019 (CZK thous.): 1 237

GA17-05095S Biomimetic materials based on conducting polymers

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: doc. Ing. Petr Humpolíček, Ph.D.

Implementation period: 2017 - 2019

Total project cost (CZK thous.): 7 611

Total project cost – TBU (CZK thous.): 3 879

Project cost of TBU in 2019 (CZK thous.): 1 293

GA19-16861S Interaction of biomaterials with stem cells under in vivo simulated conditions

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: doc. Ing. Petr Humpolíček, Ph.D.

Implementation period: 2019 - 2021

Total project cost (CZK thous.): 7 593

Total project cost – TBU (CZK thous.):	4 652
Project cost of TBU in 2019 (CZK thous.):	1 538

GA19-17457S Manufacturing and analysis of flexible piezoelectric layers for smart engineering

Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Ing. Miroslav Mrlík, Ph.D.
Implementation period: 2019 - 2021

Total project cost (CZK thous.):	8 683
Total project cost – TBU (CZK thous.):	2 856
Project cost of TBU in 2019 (CZK thous.):	952

GA19-23513S Towards New Electroluminescent Materials: Borane Cluster Compounds in Thin Polymer Films within an Electric Field

Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. et Ing. Ivo Kuřitka, Ph.D. et Ph.D.
Implementation period: 2019 - 2021

Total project cost (CZK thous.):	5 422
Total project cost – TBU (CZK thous.):	5 422
Project cost of TBU in 2019 (CZK thous.):	1 811

GA19-23647S Investigation of Correlation Among Cation Distribution, Particle Size and Physical Properties of Intelligent Spinel Ferrite Nanomaterials

Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Raghvendra Singh Yadav, Dr.
Implementation period: 2019 - 2021

Total project cost (CZK thous.):	4 929
Total project cost – TBU (CZK thous.):	4 929
Project cost of TBU in 2019 (CZK thous.):	1 639

Projects where TBU acts as a co-investigator

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 - 2020

Total project cost (CZK thous.):	9 763
Total project cost – TBU (CZK thous.):	1 983
Project cost of TBU in 2019 (CZK thous.):	0

GA17-05318S Conjugated polymers based materials as luminescence chemosensors

Principal investigator: Charles University in Prague
Project investigator on behalf of TBU: prof. Ing. Vladimír Sedlařík, Ph.D.
Implementation period: 2017 - 2019

Total project cost (CZK thous.):	6 285
Total project cost – TBU (CZK thous.):	3 060
Project cost of TBU in 2019 (CZK thous.):	1 020

GA17-10813S Novel plasma polymers with tunable stability and permeability

Principal investigator: Charles University in Prague

Project investigator on behalf of TBU: doc. Ing. Marián Lehocký, Ph.D.

Implementation period: 2017 - 2020

Total project cost (CZK thous.): 7 608

Total project cost – TBU (CZK thous.): 3 144

Project cost of TBU in 2019 (CZK thous.): 1 060

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

In 2019, 19 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 18,194 thousand for TBU in Zlín in 2019.

4.2.1 Faculty of Technology

Projects where TBU acts as a co-investigator

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

EG16_084/0010268 Development of transtibial prosthesis made by 3D printing

Principal investigator: ING corporation, spol. s r. o.

Project investigator on behalf of TBU: doc. Ing. David Paloušek, Ph.D.

Implementation period: 2017 - 2019

Total project cost (CZK thous.): 3 435

Total project cost – TBU (CZK thous.): 403

Project cost of TBU in 2019 (CZK thous.): 0

EG17_107/0012417 MIOMOVE

Principal investigator: HD GEO s.r.o.

Project investigator on behalf of TBU: prof. Ing. Petr Slobodian, Ph.D.

Implementation period: 2017 – 2021

Total project cost (CZK thous.): 18 269

Total project cost – TBU (CZK thous.): 4 511

Project cost of TBU in 2019 (CZK thous.): 672

4.2.2 Faculty of Management and Economics

Projects where TBU acts as a co-investigator

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

EG17_107/0011225 Smart factory in a factory environment

Principal investigator: ALPS Electric Czech, s.r.o.

Project investigator on behalf of TBU: doc. PhDr. Aleš Gregar, CSc.
 Implementation period: 2019 - 2020
 Total project cost (CZK thous.): 21 602
 Total project cost – TBU (CZK thous.): 2 610
 Project cost of TBU in 2019 (CZK thous.): 618

4.2.3 Faculty of Applied Informatics

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

Projects where TBU acts as a co-investigator

EG15_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: 2015 - 2020
 Total project cost (CZK thous.): 20 497
 Total project cost – TBU (CZK thous.): 2 070
 Project cost of TBU in 2019 (CZK thous.): 925

EG15_019/0004580 INFOS Platform

Principal investigator: Cominfo
 Project investigator on behalf of TBU: doc. Mgr. Milan Adámek, Ph.D.
 Implementation period: 2017 – 2019
 Total project cost (CZK thous.): 34 727
 Total project cost – TBU (CZK thous.): 5 251
 Project cost of TBU in 2019 (CZK thous.): 2 015

EG15_019/0004581 ENTER Modular System

Principal investigator: Cominfo
 Project investigator on behalf of TBU: doc. Mgr. Milan Adámek, Ph.D.
 Implementation period: 2015 – 2019
 Total project cost (CZK thous.): 25 958
 Total project cost – TBU (CZK thous.): 3 501
 Project cost of TBU in 2019 (CZK thous.): 1 343

EG16_084/0008839 Application of Research Results Focused on the Introduction of New Technologies and Procedures into the Production of Large Workpieces

Principal investigator: Slovácké strojírný, a. s.
 Project investigator on behalf of TBU: prof. Ing. Vladidír Vašek, CSc.
 Implementation period: 2017 – 2020
 Total project cost (CZK thous.): 35 700
 Total project cost – TBU (CZK thous.): 9 600
 Project cost of TBU in 2019 (CZK thous.): 1 050

EG16_084/0010327 Security System for Navigation and Communication of Airport Vehicles

Principal investigator: Masaryk University, TECHNISERV, spol. s r.o.

Project investigator on behalf of TBU: doc. RNDr. Vojtěch Křesálek, CSc.

Implementation period: 2017 – 2020

Total project cost (CZK thous.): 35 515

Total project cost – TBU (CZK thous.): 3 697

Project cost of TBU in 2019 (CZK thous.): 0

EG16_084/0009949 Research and development of advanced LED luminaires for industrial use

Principal investigator: TREVOS, a. s.

Project investigator on behalf of TBU: doc. Ing. Miroslav Maňas, CSc.

Implementation period: 2017 – 2020

Total project cost (CZK thous.): 18 582

Total project cost – TBU (CZK thous.): 3 074

Project cost of TBU in 2019 (CZK thous.): 1 976

EG17_107/0012477 Expert system for custom manufacturing enterprises with Industry 4.0 support

Principal investigator: CATHEDRAL Software, s.r.o.

Project investigator on behalf of TBU: Ing. Tomáš Dulík, Ph.D.

Implementation period: 2016 – 2020

Total project cost (CZK thous.): 7 480

Total project cost – TBU (CZK thous.): 3 735

Project cost of TBU in 2019 (CZK thous.): 331

CZ.01.1.02/0.0/0.0/17_107/0012503 Research and development of eHealth Integrated Telemedicine Application Platform

Principal investigator: Euro Enterprise Development s. r. o.

Project investigator on behalf of TBU: prof. Mgr. Roman Jašek, Ph.D.

Implementation period: 2018 – 2020

Total project cost (CZK thous.): 16 935

Total project cost – TBU (CZK thous.): 1 692

Project cost of TBU in 2019 (CZK thous.): 564

TRIO Programme

FV20419 Intelligent System For Advanced Sorting of Forest Plants

Principal investigator: DENESA s. r. o.

Project investigator on behalf of TBU: prof. Ing. Vladimír Vašek, CSc.

Implementation period: 2017 – 2020

Total project cost (CZK thous.): 18 078

Total project cost – TBU (CZK thous.): 7 744

Project cost of TBU in 2019 (CZK thous.): 2 385

4.2.4 Faculty of Logistic and Crisis Management

TRIO Programme

Projects where TBU acts as a co-investigator

FV30337 Bioactive glass matrices for effective water hygienization

Principal investigator: NEDFORM s.r.o.

Project investigator on behalf of TBU: doc. Ing. Pavel Valášek, CSc.

Implementation period: 2018 – 2020

Total project cost (CZK thous.): 10 912

Total project cost – TBU (CZK thous.): 5 313

Project cost of TBU in 2019 (CZK thous.): 2 751

4.2.5 University Institute

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

Projects where TBU acts as a co-investigator

EG15_019/0004549 Imflamable systems according to EN 45545 for composite fabrication

Principal investigator: 5M s. r. o.

Project investigator on behalf of TBU: doc. Ing. Michal Sedlačík, Ph.D.

Implementation period: 2015 - 2019

Total project cost (CZK thous.): 14 116

Total project cost – TBU (CZK thous.): 1 306

Project cost of TBU in 2019 (CZK thous.): 579

EG15_019/0005090 Stenopeic 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: 2015 - 2019

Total project cost (CZK thous.): 3 600

Total project cost – TBU (CZK thous.): 1 801

Project cost of TBU in 2019 (CZK thous.): 586

TRIO Programme

Projects where TBU acts as a co-investigator

FV10756 Development of polymer carriers in sub-micro and nano-forms

Principal investigator: MVDr. Jiří Pantůček

Project investigator on behalf of TBU: prof. Ing. Vladimír Sedlařík, Ph.D.

Implementation period: 2016 - 2020

Total project cost (CZK thous.): 3 822

Total project cost – TBU (CZK thous.): 1 909

Project cost of TBU in 2019 (CZK thous.): 500

FV20088 Development of novel formulations for modification of asphalt mixtures using recycled polyvinylbutyral

Principal investigator: SKLOPAN LIBEREC, a. s.

Project investigator on behalf of TBU: doc. Ing. Tomáš Sedláček, Ph.D.

Implementation period: 2017 - 2020

Total project cost (CZK thous.): 2 876

Total project cost – TBU (CZK thous.): 1 952

Project cost of TBU in 2019 (CZK thous.): 513

FV30048 New additives for multifunctional modification of polymer surfaces

Principal investigator: Synthesia, a.s.

Project investigator on behalf of TBU: prof. Ing. Vladimír Sedlařík, Ph.D.

Implementation period: 2018 - 2021

Total project cost (CZK thous.): 19 978

Total project cost – TBU (CZK thous.): 3 200

Project cost of TBU in 2019 (CZK thous.): 800

FV40377 Research and development of a biocompatible material for controlled drug release and transport into the cornea

Principal investigator: GEMINI eye clinic, a. s.

Project investigator on behalf of TBU: Ing. Pavel Urbánek, Ph.D.

Implementation period: 2019 - 2022

Total project cost (CZK thous.): 10 152

Total project cost – TBU (CZK thous.): 3 095

Project cost of TBU in 2019 (CZK thous.): 586

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

In 2019, 12 projects financed by the Ministry of Education, Youth and Sports of the Czech Republic, included 2 projects H2020 were implemented at the TBU in Zlín. Total eligible costs amounted CZK 88,581 thousand for TBU in Zlín in 2019.

4.3.1 Faculty of Technology

INTER-EXCELLENCE Programme (2016 – 2024)

LTACH17015 Fabrication and electrochemical properties of hierarchical polyaniline /bimetallic oxides electrodes

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: doc. Ing. Natalia Kazantseva, CSc.

Implementation period: 2017 - 2019

Total project cost (CZK thous.):	5 970
Total project cost – TBU (CZK thous.):	5 970
Project cost of TBU in 2019 (CZK thous.):	1 990

Horizon 2020 Programme

Projects where TBU acts as a co-investigator

862910 Strategies of circular Economy and Advanced bio-based solutions to keep our Lands and seas alIVE from plastics contamination (SEALIVE)

Principal investigator: INSTITUTO TECNOLÓGICO DEL EMBALAJE, TRANSPORTE Y LOGÍSTICA (ITENE)

Project investigator on behalf of TBU: prof. Mgr. Marek Koutný, Ph.D.

Implementation period: 2019 – 2023

Total project cost (CZK thous.):	282 111
Total project cost – TBU (CZK thous.):	8 218
Project cost of TBU in 2019 (CZK thous.):	1 644

4.3.2 Faculty of Management and Economics

Horizon 2020 Programme

Projects where TBU acts as a co-investigator

731264 SHAPE-ENERGY: Social Sciences and Humanities for Advancing Policy in European Energy

Principal investigator: Anglia Ruskin University (United Kingdom)

Project investigator on behalf of TBU: Ing. Přemysl Pálka, Ph.D.

Implementation period: 2017 - 2019

Total project cost (CZK thous.):	53 947
Total project cost – TBU (CZK thous.):	1 500
Project cost of TBU in 2019 (CZK thous.):	87

MOBILITY Programme

8J19UA010 EU Environmental Policy on Solid Domestic Waste Management and its Implementation in Ukraine and the Czech Republic

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: JUDr. Jiří Zícha, Ph.D.

Implementation period: 2019 - 2020

Total project cost (CZK thous.):	162
Total project cost – TBU (CZK thous.):	162
Project cost of TBU in 2019 (CZK thous.):	108

4.3.3 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 2019 (CZK thous.): 13 884

MOBILITY Programme

8JCH1001 Optimization of consumption water, electric power and heat in the processes in which raw hide is transformed into leather

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: prof. Ing. Dagmar Janáčková, CSc.

Implementation period: 2019 - 2020

Total project cost (CZK thous.): 298

Total project cost – TBU (CZK thous.): 298

Project cost of TBU in 2019 (CZK thous.): 149

INTER EUREKA Programme

Projects where TBU acts as a co-investigator

LTE2019003 FERTI-MAIZE foliar fertilizer for maize based on protein by-products

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: prof. Ing. Karel Kolomazník, DrSc.

Implementation period: 2019 - 2022

Total project cost (CZK thous.): 4 920

Total project cost – TBU (CZK thous.): 1 584

Project cost of TBU in 2019 (CZK thous.): 180

4.3.4 Faculty of Humanities

Educational Policy Fund

Preventing Shock in Future Nursery and Primary School Teachers When Confronting Reality in the Period of the Commencement of Their Career

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: doc. PaedDr. Adriana Wiegerová, PhD.

Implementation period: 2017 – 2020

Total project cost (CZK thous.): 8 253

Total project cost – TBU (CZK thous.): 8 253

Project cost of TBU in 2019 (CZK thous.): 3 000

4.3.5 Faculty of Logistics and Crisis Management

COST Programme

Geographical aspects of Citizen Science: mapping trends, scientific potential and societal impacts in the Czech Republic

Principal investigator: AV ČR

Project investigator on behalf of TBU: RNDr. Jakub Trojan MSc Ph.D.

Implementation period: 2018 – 2020

Total project cost (CZK thous.): 2 805

Total project cost – TBU (CZK thous.): 1 228

Project cost of TBU in 2019 (CZK thous.): 511

4.3.6 University Institute

National Programme for Sustainability

LO1504 Centre of Polymer Systems Plus

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: prof. 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 2019 (CZK thous.): 66 600

MOBILITY Programme

8JPL19031 Development of novel additives for thermoplastic processing of biodegradable polymers

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: prof. Ing. Vladimír Sedlařík, Ph.D.

Implementation period: 2019 - 2020

Total project cost (CZK thous.): 165

Total project cost – TBU (CZK thous.): 165

Project cost of TBU in 2019 (CZK thous.): 85

INTER ACTION Programme

LTAB19019 Preparation of nano- and micro-structured materials using self-organized protein fibrillar systems

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Ing. Antonín Minařík, Ph.D.

Implementation period: 2019 - 2020

Total project cost (CZK thous.): 1 170

Total project cost – TBU (CZK thous.): 1 170

Project cost of TBU in 2019 (CZK thous.): 390

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

In 2019, 6 projects financed by the Ministry of the Interior of the Czech Republic was implemented at the TBU in Zlín. Total eligible costs amounted CZK 7,271 thousand for TBU in Zlín in 2019.

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.): 33 881

Total project cost – TBU (CZK thous.): 8 763

Project cost of TBU in 2019 (CZK thous.): 1 774

VI20192022134 System of more accurate prediction of convective precipitation over the regional territorial unit

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Ing. David Šaur, Ph.D.

Implementation period: 2019 - 2022

Total project cost (CZK thous.): 13 273

Total project cost – TBU (CZK thous.): 7 887

Project cost of TBU in 2019 (CZK thous.): 1 821

VI20192021163 Built-up and operation development of security systems at mass events

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Ing. Dora Lapková, Ph.D.

Implementation period: 2019 - 2021

Total project cost (CZK thous.): 2 118

Total project cost – TBU (CZK thous.): 2 118

Project cost of TBU in 2019 (CZK thous.): 410

Projects where TBU acts as a co-investigator

VI20172019073 Identification and methods of protection of Czech soft targets against violent acts with elaboration of a warning system

Principal investigator: Soft Targets Protection Institute, z.ú.

Project investigator on behalf of TBU: Ing. Martin Hromada, Ph.D.

Implementation period: 2017 - 2019

Total project cost (CZK thous.): 9 664

Total project cost – TBU (CZK thous.):	3 103
Project cost of TBU in 2019 (CZK thous.):	1 034

VI20172019054 An analytical software module for the real-time resilience evaluation from point of the converged security

Principal investigator: TTC MARCONI s. r. o.
 Project investigator on behalf of TBU: Ing. Jan Valouch, Ph.D.
 Implementation period: 2017 - 2019

Total project cost (CZK thous.):	19 431
Total project cost – TBU (CZK thous.):	5 648
Project cost of TBU in 2019 (CZK thous.):	1 910

VI20192022118 Soft targets protection in the security environment of the Czech Republic

Principal investigator: VUT Brno
 Project investigator on behalf of TBU: doc. Ing. Martin Hromada, Ph.D.
 Implementation period: 2019 - 2022

Total project cost (CZK thous.):	16 781
Total project cost – TBU (CZK thous.):	2 100
Project cost of TBU in 2019 (CZK thous.):	322

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

In 2019, 3 projects financed by the Ministry of Agriculture of the Czech Republic was implemented at the TBU in Zlín. Total eligible costs amounted CZK 3,204 thousand for TBU in Zlín in 2019.

4.5.1 Faculty of Technology

Projects where TBU acts as a co-investigator

ZEMĚ Programme

QK1710156 New approaches and methods of analysis to ensure the quality, safety and health perfection of cheeses, the optimization of their manufacturing and the perfection of hygiene and sanitation together with the lowering of environmental load by waste water

Principal investigator: Výzkumný ústav mlékárenský s. r.o.
 Project investigator on behalf of TBU: doc. Ing. František Buňka, Ph.D.
 Implementation period: 2017 - 2021

Total project cost (CZK thous.):	18 838
Total project cost – TBU (CZK thous.):	3 252
Project cost of TBU in 2019 (CZK thous.):	700

QK1920190 Meat cooking loss: effect of fresh meat characteristics, cooking technology and parameters of cooking

Principal investigator: Veterinární a farmaceutická univerzita Brno

Project investigator on behalf of TBU: Ing. Robert Gál, Ph.D.

Implementation period: 2019 - 2021

Total project cost (CZK thous.): 6 488

Total project cost – TBU (CZK thous.): 2 937

Project cost of TBU in 2019 (CZK thous.): 1 154

4.5.2 University Institute

ZEMĚ Programme

QK1910392 Environmentally friendly soil conservation materials for the crop production intensification based on renewable resource

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: prof. Ing. Vladimír Sedlařík, Ph.D.

Implementation period: 2019 - 2023

Total project cost (CZK thous.): 16 511

Total project cost – TBU (CZK thous.): 6 952

Project cost of TBU in 2019 (CZK thous.): 1 350

4.6 Projects financed by the Technology Agency of the Czech Republic

In 2019, 19 projects financed by the Technology Agency of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 27,767 thousand for TBU in Zlín in 2019.

4.6.1 Faculty of Technology

THÉTA Programme

Projects where TBU acts as a co-investigator

TK01030054 Controlled biological methane production in situ

Principal investigator: EPS biotechnology, s. r. o.

Project investigator on behalf of TBU: doc. Mgr. Marek Koutný, Ph.D.

Implementation period: 2018 - 2022

Total project cost (CZK thous.): 15 464

Total project cost – TBU (CZK thous.): 3 490

Project cost of TBU in 2019 (CZK thous.): 743

4.6.2 Faculty of Management and Economics

ZÉTA Programme

TJ01000114 Application of smart governance approaches to organizational structures of municipalities in the Czech Republic

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Ing. Filip Kučera

Implementation period: 2017 - 2019

Total project cost (CZK thous.): 1 523

Total project cost – TBU (CZK thous.): 1 523

Project cost of TBU in 2019 (CZK thous.): 515

TJ02000339 Knowledge of Behavioral Economics and its Application at the Level of Municipalities and Regions in the Czech Republic

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Ing. Filip Kučera

Implementation period: 2019 - 2021

Total project cost (CZK thous.): 2 018

Total project cost – TBU (CZK thous.): 1 598

Project cost of TBU in 2019 (CZK thous.): 411

Projects where TBU acts as a co-investigator

ÉTA Programme

TJ01000191 Innovation of tourism management systems by means of process management tools

Principal investigator: ZČU Plzeň

Project investigator on behalf of TBU: doc. Ing. Zuzana Tučková, Ph.D.

Implementation period: 2018 - 2022

Total project cost (CZK thous.): 11 974

Total project cost – TBU (CZK thous.): 1 387

Project cost of TBU in 2019 (CZK thous.): 368

4.6.3 Faculty of Multimedia and Communications

ÉTA Programme

TL02000255 A Managerial Model of Design Value for Competitiveness of SME in the Czech Republic

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Ing. Eva Šviráková, Ph.D.

Implementation period: 2019 - 2020

Total project cost (CZK thous.): 2 002

Total project cost – TBU (CZK thous.): 1 251

Project cost of TBU in 2019 (CZK thous.): 696

4.6.4 Faculty of Applied Informatics

EPSILON Programme

TH02020979 Distributed control system for regional heat and cooling supply conceived as Smart Energy Grid

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: prof. Ing. Vladimír Vašek, CSc.

Implementation period: 2017 - 2020

Total project cost (CZK thous.): 9 383

Total project cost – TBU (CZK thous.): 4 632

Project cost of TBU in 2019 (CZK thous.): 1 333

Projects where TBU acts as a co-investigator

TH04010377 Development of methods of identification and protection of soft targets within transport infrastructure to increase their security and resistance to terrorist threats

Principal investigator: VUT Brno

Project investigator on behalf of TBU: Ing. Dora Lapková, Ph.D.

Implementation period: 2019 - 2022

Total project cost (CZK thous.): 10 836

Total project cost – TBU (CZK thous.): 5 258

Project cost of TBU in 2019 (CZK thous.): 1 080

4.6.5 Faculty of Humanities

ÉTA Programme

TL02000331 The Conception of Education for the Alpha Generation with Using Research-Based Principles of Learning at Nursery Schools

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: doc. PaedDr. Jana Majerčíková, Ph.D.

Implementation period: 2019 - 2020

Total project cost (CZK thous.): 2 215

Total project cost – TBU (CZK thous.): 1 215

Project cost of TBU in 2019 (CZK thous.): 996

4.6.6 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.): 206 807

Total project cost – TBU (CZK thous.): 68 321

Project cost of TBU in 2019 (CZK thous.): 8 830

Projects where TBU acts as a co-investigator

TE02000006 Centre for alternative environment friendly high effective polymer anti-microbial agents for industrial applications

Principal investigator: SYNPO, akciová společnost

Project investigator on behalf of TBU: prof. Ing. Vladimír Sedlařík, Ph.D.

Implementation period: 2014 - 2019

Total project cost (CZK thous.): 126 338

Total project cost – TBU (CZK thous.): 31 824

Project cost of TBU in 2019 (CZK thous.): 1 400

EPSILON Programme

TH02020836 Development of novel plastic based environmentally friendly food packaging materials with added value

Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: prof. Ing. Vladimír Sedlařík, Ph.D.

Implementation period: 2017-2020

Total project cost (CZK thous.): 3 984

Total project cost – TBU (CZK thous.): 1584

Project cost of TBU in 2019 (CZK thous.): 396

Projects where TBU acts as a co-investigator

TH03020117 Conductive materials and their application for antistatic and dissipative treatment of the paper and polymeric products

Principal investigator: Centrum organické chemie s. r. o.

Project investigator on behalf of TBU: prof. Ing. Vladimír Sedlařík, Ph.D.

Implementation period: 2018-2021

Total project cost (CZK thous.): 19 910

Total project cost – TBU (CZK thous.): 2 800

Project cost of TBU in 2019 (CZK thous.): 700

TH04020466 REAKTIN - Longfiber composites for serial production

Principal investigator: 5M s. r. o.

Project investigator on behalf of TBU: doc. Ing. Tomáš Sedláček, Ph.D.

Implementation period: 2019-2022

Total project cost (CZK thous.): 9 889

Total project cost – TBU (CZK thous.): 2 065

Project cost of TBU in 2019 (CZK thous.): 430

GAMA Programme

TG03010052 Commercialization at the Tomas Bata University in Zlin

Project investigator on behalf of TBU: Ing. Miroslava Komínková, Ph.D.

Implementation period: 2016-2019

Total project cost (CZK thous.): 10 301

Total project cost – TBU (CZK thous.):	10 301
Project cost of TBU in 2019 (CZK thous.):	4 251

ZÉTA Programme

TJ01000142 Individual Healthy Footwear

Project investigator on behalf of TBU: Ing. Petra Barešová, Ph.D.

Implementation period: 2018-2019

Total project cost (CZK thous.):	2 333
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Total project cost – TBU (CZK thous.):	2 333
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Project cost of TBU in 2019 (CZK thous.):	1 330
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TJ01000329 Sensory-active polymer blends containing products of advanced extraction techniques of selected plants

Project investigator on behalf of TBU: Ing. Martina Pummerová, Ph.D.

Implementation period: 2018-2019

Total project cost (CZK thous.):	1 967
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Total project cost – TBU (CZK thous.):	1 967
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Project cost of TBU in 2019 (CZK thous.):	990
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TJ01000330 Novel plastics stabilizers based on natural bioactive compounds

Project investigator on behalf of TBU: Ing. Anna Hurajová, Ph.D.

Implementation period: 2018-2019

Total project cost (CZK thous.):	1 975
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Total project cost – TBU (CZK thous.):	1 975
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Project cost of TBU in 2019 (CZK thous.):	990
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TJ02000125 Hi-tech footwear skin

Project investigator on behalf of TBU: MgA. Zuzana Bahulová, Ph.D.

Implementation period: 2019 - 2021

Total project cost (CZK thous.):	7 343
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Total project cost – TBU (CZK thous.):	6 527
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Project cost of TBU in 2019 (CZK thous.):	1 643
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TJ02000269 Nanostructured filtration materials for elimination of arsenic in water

Project investigator on behalf of TBU: RNDr. Eva Dominová Bergerová, Ph.D.

Implementation period: 2019 - 2021

Total project cost (CZK thous.):	2 399
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Total project cost – TBU (CZK thous.):	1 608
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Project cost of TBU in 2019 (CZK thous.):	665
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4.7 Projects financed by the Ministry of Culture

In 2019, 1 project financed by the Ministry of Culture was implemented at the TBU in Zlín. Total eligible costs amounted CZK 3,718 thousand for TBU in Zlín in 2019.

4.7.1 Faculty of Multimedia Communications

NAKI II Programme

Projects where TBU acts as a co-investigator

DG18P02OVV059 Designers in the Czech Lands and the Czechoslovak Machinery Industry

Principal investigator: National Technical Museum

Project investigator on behalf of TBU: doc. PhDr. Zdeno Kolesár Ph.D.

Implementation period: 2018 - 2022

Total project cost (CZK thous.):	23 534
Total project cost – TBU (CZK thous.):	11 080
Project cost of TBU in 2019 (CZK thous.):	3 718

4.8 PROJECTS – SUMMARY

Number of projects implemented in 2019

Component part / Provider	European Commission	Czech Science Foundation	Ministry of Culture	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	1	0	2	2	1	0	2	1	8
Faculty of Management and Economics	1	2	0	1	1	1	0	0	3	8
Faculty of Multimedia Communications	0	0	1	0	0	0	0	0	1	2
Faculty of Applied Informatics	0	0	0	9	8	3	6	0	2	20
Faculty of Humanities	0	2	0	0	0	1	0	0	1	4
Faculty of Logistics and Crisis Management	0	0	0	1	0	1	0	0	0	2
TBU Library	0	0	0	0	0	0	0	0	0	0
University Institute	0	9	0	6	2	3	0	1	11	30
Rectorate	0	0	0	0	0	0	0	0	0	0
TBU total	2	14	1	19	13	10	6	3	19	74

Total costs acknowledged for TBU in Zlín in 2019 (in CZK thousands)

Component part / Provider	European Commission	Czech Science Foundation	Ministry of Culture	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	1 644	1 652	0	672	672	1 990	0	1 854	743	8 555
Faculty of Management and Economics	87	572	0	618	618	108	0	0	1 294	2 679
Faculty of Multimedia Communications	0	0	3 718	0	0	0	0	0	696	4 414
Faculty of Applied Informatics	0	0	0	10 589	8 204	14 213	7 271	0	2 413	34 486
Faculty of Humanities	0	1 482	0	0	0	3 000	0	0	996	5 478
Faculty of Logistics and Crisis Management	0	0	0	2 751	0	511	0	0	0	3 262
TBU Library	0	0	0	0	0	0	0	0	0	0
University Institute	0	10 550	0	3 564	1 165	67 075	0	1 350	21 625	104 164
Rectorate	0	0	0	0	0	0	0	0	0	0
TBU total	1 731	14 256	3 718	18 194	10 659	86 897	7 271	3 204	27 767	163 038

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