Tomas Bata University in Zlín

Science Activity Annual Report

2015

CONTENT

1 DEFENDED DOCTORAL THESES

In 2015, a total of 41 theses were defended:18 at the Faculty of Technology, 14 at the Faculty of Management and Economics, 3 at the Faculty of Multimedia Communications and 6 at the Faculty of Applied Informatics.

1.1 Faculty of Technology

Degree Programme: CHEMISTRY AND MATERIALS TECHNOLOGY

Degree Course: Technology of Macromolecular Compounds

Davit Bleyan, Ph.D.

Date of defence: 18. 9. 2015

Supervisor: Ing. Berenika Hausnerová, Ph.D.

Binder Systems for Powder Injection Moulding

Abstract

Powder injection moulding (PIM) is a net shape, multi-stage production technique for manufacturing complex geometry parts in high production volumes. PIM process involves four main production stages: mixing, injection moulding, debinding and sintering. For such multi-stage processing technique, the deliberate choice of component materials can significantly reduce the defect formations during consequent stages, as well as positively influence the energy efficiency, while reducing processing time. The aim of the thesis was to study the role of particular binder components and their interactions with mould channel walls, for development of a novel, environmentally friendly feedstocks. For novel binder systems polyethylene glycol was used as plasticiser which allowed using water for solvent debinding, instead of highly reactive chemicals (acetone, hexane, heptane). Different molecular weight PEGs served for balancing the initial weight loss during thermal debinding, ensuring gradual binder extraction. The use of carnauba wax as another binder component was motivated by the aim to lower the mixing temperatures, which is crucial for using advanced reactive fillers such as titanium. Further, it allowed replacing the synthetic backbone polymers by eco-friendly renewable natural components, increasing the environmental sustainability of this technology. The debinding characteristics of newly composed feed-

stocks were studied using thermogravimetric analysis. The results have shown that carnauba wax exhibited superior debinding properties compared to polyethylene and paraffin wax, with gradual thermal extraction up to late debinding stage. Further, alongside carnauba wax, another novel binder - acarawax was considered as a substitute for polyolefins. In order to study the feedstocks in detail, the adhesion between binder system components, as well as binders, powders and the mould materials was investigated. Contact angle analysis was performed, and using acid base model, surface energies were evaluated. Binders showed similar values with only exception of PEG and to some extent acrawax which exhibited much higher surface energies and polar component values. Among mould materials the heat-treated steel showed the highest value of surface energy, and noticeably higher polar component too. For the ceramic powders Al2O3 and ZrO2 the obtained values were rather similar. For studying the interactions and chemical mechanism occurring within binder system, the components were substituted with their low molecular analogues. The specific interactions of the substitutes were evaluated using combined FTIR and analogue calorimetry. The highest cross interaction values suggesting strong interactions were obtained for analogues of PEG and acrawax. This study provides an important understanding of the role of particular binder system components and their interactions, which will allow to precisely balancing the feedstock composition, positively influencing the energy efficiency and processing properties of a PIM cycle.

Ing. **Jarmila Černochová**, Ph.D.

Date of defence: 15. 9. 2015

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

Molecular Assemblies of Supramolecular Polymers

Abstract

Supramolecular chemistry is rather new, however, exciting cross-disciplinary field of chemical science. Recently, many supramolecular systems are extensively studied in laboratories around the world. This work has been aimed at synthesis of low-molecular-weight components of supramolecular polymers. Particularly, the two series of the guest molecules bearing lipophilic adamantane moiety at terminal positions have been prepared and their supramolecular properties have been studied. The macrocycles Beta-cyclodextrin

(BetaCD and cucurbit[7]uril (CB7) were chosen as a host molecules for their suitable cavity size. The interior cavity of both these macrocycles perfectly matches the spherical adamantane moiety to form highly stable aggregates. The imidazolium and benzimidazolium based spacers were employed to increase the water soubility of final guest molecules. All new prepared compounds were characterized by means of NMR, ESI-MS, IR and EA. Supramolecular properties of selected guests with cavitands were examined using 1H NMR, 2D NMR, ESI-MS and ITC. One compound from the first serie, namely 1-(4-(1-adamantylcarbonyl)phenylmethyl)-3-butylimidazolium bromide, displayed an interesting behavior towards Beta-CD and CB7. Despite the 100 times lower affinity, cyclodextrin was able to push out the CB7 unit from its prefered binding site. Corresponding energetic loss was compensed by binding of CB7 to the second, unprefered site. The compounds of the second serie displayed very interesting relationship between the host-guest binding mode and fragmentation pattern in ESI-MS spectra.

Ing. **Miroslav Janíček,** Ph.D.

Date of defence: 16. 4. 2015

Supervisor: doc. Ing. Roman Čermák, Ph.D.

Crystallization of Polymeric Materials: Study of Nucleation on Active Particles with Large Specific Surface

Abstract

Crystallization of polymeric materials is a thermodynamic process during which a solid matter with crystalline structure is formed. In comparison with lowmolecular substances the crystallization of polymers is complicated by length, periodicity, and structural complexity of macromolecular chains. Kinetics of this process is further driven by thermodynamic conditions - namely by temperature and presence of active surface within the system. This thesis focuses on description of first phase of the crystallization, which is nucleation. An attention is paid to initial and boundary conditions of spontaneous homogeneous and heterogeneous nucleations.

Ing. **Alena Pavelková**, Ph.D.

Date of defence: 11. 12. 2015

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

Biodegradable Polyesters and Polyanhydrides for Advanced Applications

This work is focused on preparation and characterization of novel types of biodegradable polyesters and polyanhydrides. Besides the summary of the state of art in the field of biodegradable polymers, a detailed description of biodegradable polylactic acid-polyethylene glycol copolymers preparation is presented, including their applicability on encapsulation technologies. Further part of this work is dedicated to optimization of poly (sebacic anhydride) synthesis. Third part deals with preparation and characterization of polyester urethanes based on polylactic acid and polyethylene glycol linked with biocompatible diisocyanate derived from an amino acid - lysine. Degradation behaviour description of the prepared polymers is integral part of this thesis. Potential application of the compounds can be found in the fields where controlled release of bioactive compounds is required.

Ing. **Petra Peer**, Ph.D.

Date of defence: 23. 6. 2015

Supervisor: doc. Petr Filip, CSc.

Rheological Characterization of Polymer Solutions with Respect to Quality of Electrospinning Process

Abstract

Nowadays, nanofibrous layers are intensively studied for their unique properties and potential applications. For instance medical applications like tissue engineering use fibres as a carrier of the cells. The advantage of the nanofibrous layers is a high specific surface area together with high porosity and fibre diameters reaching at most hundreds of nanometres. There are many production processes of nanofibres to which we can include an electrostatic spinning from polymer solutions or melts. If a polymer solution is exposed to external high voltage evoking electrostatic forces, the fibres are emitted from the surface layer of polymer solution and finally collected in drawing state. Rheological characterization of polymer solutions represents a crucial factor influencing electrostatic spinning and thus

morphology of nanofibres. Flow behaviour of polymer solutions is influenced by polymer, solvent, concentration of solution, additives and mechanical stress or temperature, to mention a few. Large amount of the modern methods exists for the characterisation of the rheological properties of fluid including those enabling measurements under an electric field. Primary attention in this work is paid to an influence of an electric field on rheological characteristics of polymer solutions. In the first part, the devices enabling measurements in presence of electric field are compared. The second part is devoted to the influence of electric field on shear viscosity of polymer solutions, to the stability of polymer solutions in time and to the influence of polymer solutions preparation on rheological characteristics in connection with a process of electrospinning. Primary attention in this work is paid to an influence of an electric field on rheological characteristics of polymer solutions. In the first part, the devices enabling measurements in presence of electric field are compared. The second part is devoted to the influence of electric field on shear viscosity of polymer solutions, to the stability of polymer solutions in time in connection with a process of electrospinning. Finally, the magnetorheology of polymer solution with magnetic nanoparticles and the spinnability of this fluid were investigated.

Ing. **Eliška Rajnohová**, Ph.D.

Date of defence: 15. 12. 2015

Supervisor: Ing. Antonín Minařík, Ph.D.

Stabilization of Biopolymer Solutions

Abstract

This thesis deals with stabilization of biopolymer solutions from the physical-chemical perspective. The self-organizing flows (Bénard-Marangoni or Rayleigh-Bénard convective instability) are used in order to reach new stable arrangement of macromolecular systems, 2-hydroxyethylcellulose (2-HEC) and sodium hyaluronate (HA). Deliberately induced changes in these macromolecular systems were studied with respect to variations in polymer surface activity at phase interfaces liquid/gas, variations in mean diameter of polymer coils and viscous characteristics. Further, the ability of these systems to form self-supporting polymer foils with varying degree of polymer matrix organization was investigated. Special device, which can modify polymer solutions in defined temperature gradi-

ents with the further possibility to solidify these solutions into a self-supporting polymer foils, was designed and constructed for the purposes of this thesis. The experimental data show that with optimal process parameters (temperature, temperature gradient, time, liquid height) and system parameters (molecular weight and its distribution, viscosity, etc.) one can influence surface activity, mean size of polymer coils and flow characteristics of macromolecular systems in water and physiological solutions without changing ionic strength or pH. Such modified solutions can be easily solidified into self-supporting foils exhibiting typical topographical and mechanical properties.

Rushita Jaswan Shah, Ph.D.

Date of defence: 16. 12. 2015

Supervisor: doc. Nabanita Saha, M.Sc., Ph.D.

Biomineralized and Stimuli Responsive Hydrogel for Biomedical Applications

Abstract

In the last decade, tissue engineering and regenerative medicine actively focus on scaffolds which have a three dimensional structure for a better regeneration of tissue. Depending on the type of regeneration needed, the scaffolds can be prepared for both hard and soft tissues. Hard tissues are basically represented by bone composites containing organic matrix reinforced by inorganic minerals in the form of a hybrid structure. A relatively new concept in the development of scaffolds for the hard tissues is the formation of Biomimicry formed in the matrix through biomineralization. In these cases, the matrix is mostly represented by a biomaterial in which the crystal structure of minerals grows. From many available biomaterials hydrogels are preferred especially due to their ability to store large amount of liquid and create environment favourable for regeneration of living tissue. The current doctoral thesis focuses on a research of establishing possible ways of biomimetic preparation of scaffolds through a mineralization process in the hydrogel matrix. Through a simple liquid diffusion technique, aqueous solutions of Na2CO3 and CaCl2 were incorporated into the blend of PVP-CMC hydrogels, which was chosen to be an ideal matrix. A number of mineralized samples was proposed and prepared - differing in strength of concentration of the biomimetic process, formation of mineral crystal structure and different

characteristics of the formed scaffold structure. These newly formed scaffold structures were named "Biomineralized (CaCO3) PVP-CMC hydrogel." Identifying the -CO3 presence in the hydrogel structure, and thereby confirming the success of the biomineralization process was carried out by the FTIR method, which encountered the peaks at 1405cm-1 and 871cm-1. XRD method then identified the calcite in the porous structure of PVP-CMC hydrogel. Morphological evaluation of the biomineralized structure through the SEM analysis proved that the micro-pores distribution within the hydrogel structure appeared in the range of 1-170 micrometres. The level to which the pores were filled up by the calcite was evaluated by measurement of density of the samples in relation to non-filled system. Information about the composition of the scaffold system was added by the TGA measurement. Viscoelastic properties of the prepared systems were measured using parallel plate rheometer (ARES), where complex viscosity, storage and loss moduli were evaluated. As per the expectations, the more intense the biomineralization process was, the lower the parameters determining the share of elasticity of the mineralized scaffold were and the higher the values determining the viscous properties. On top of that, mineralized scaffolds showed more difficulties to deformation in load in relation to non-filled hydrogels which can influence the ways of application of hard biomineralized scaffolds. Further, the conditions influencing the regeneration effectivity of mineralized scaffolds were investigated. The scaffolds were evaluated from the points of view of swelling ability of biological solutions containing glucose, urea and physiological solutions. Experiments were carried out under physiologically relevant conditions. Evaluation was done based on relative increase of volume of the scaffold. The highest swelling ability was in the presence of urea solution followed by the physiological solution. Glucose solution had the least swelling ability. Eventually, the starting experiments evaluating cytotoxicity were carried out. Mouse embryonic fibroblasts were placed into the biomineralized scaffold for 24, 48 and 72 hours and also MG 63 Osteosarcoma cells were retained for 1 and 7 day period. However, viability with both the cells reached more than 80% which proves that the new type of biomineralized scaffold is of non-toxic nature.

Dipl. Ing. **Johannes Peter Andreas Steinhaus**, Ph.D.

Date of defence: 16. 4. 2015

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

Real-time Investigation of Curing Mechanisms of Thermoset Resins for Medical and Technical Applications

Abstract

In this doctoral thesis the curing process of visible light-curing (VLC) dental composites and 3D printing rapid prototyping (RP) materials are investigated with the focus on dielectric analysis (DEA). This method is able to monitor the curing of resins in an alternating electric fringe field with adjustable frequencies and is often used for cure control of composites manufacturing in the aviation and automotive industry but hardly established in dental science or RP method development. It is capable of investigating very fast initiation and primary curing processes using high frequencies in the kHz-range. The aim of the Thesis is a better understanding of the curing processes with respect to curing parameters such as resin composition, viscosity, temperature, and for light-curing composites also light intensity and irradiation depth. Due to the nature of both dental and RP systems an application of specific experimental set-up had to be designed allowing for the generation of reproducible and valid results. Subsequently, different evaluation methods were developed to characterize the curing behavior of both material types. A special focus was paid to the determination of kinetic parameters from DEA measurements. Reaction rates of the curing of the corresponding thermosets were calculated and applied to the ion viscosity curves measured by DEA to evaluate reaction kinetic parameters. For the dental composites it could be clearly shown that the initial curing rate is directly proportional to light intensity and not to its square root as proposed by many others authors. A good description of the curing behaviour of 3DP RP materials was also achieved assuming a reaction order smaller than one. This data provides the base for the kinetic modeling of polymerization and curing processes proposed within the Thesis.

Ing. **Barbora Šibová**, Ph.D.

Date of defence: 24. 4. 2015

Supervisor: doc. RNDr. Petr Ponížil, Ph.D.

The Shape Changes of Feet and Possibilities of their Influence on Shoes

Abstract

This dissertation was focused on the changes in the shape of their feet and the possibility of influencing shoes. Currently dangerously increasing number of cases wearing footwear, which is dimensionally disproportional with the individual shape of the foot. It can be assumed that the increasing disproportion dimensional legs of today's customers are strongly deformed. The issue of the deformation behavior of the feet, especially in metatarsophalangeal joint, still has not given sufficient attention. On the basis of these facts the Institute of Physics and Materials Engineering at Tomas Bata University in Zlín developed device for measuring the deformability of the foot, which would simulate the tires to narrow shoes. We can measure, with this device, the actual dimensions of the legs in a circumferential load effect of tensile force that is developed device. The results obtained in the present work can be stated that the right leg and the left foot is different, thus the deformability of the right foot is always higher than the deformability of the left foot, regardless of whether they are right-handed or left-handed proband or the proband with the right reflective or left foot. This fact therefore follows that it is necessary to take measurements for the right and left leg. Further measurements showed that the human foot is easily deformable part of the human body, especially when compared with the findings wearing thinner and smaller shoes. This fact has not been sufficiently studied either in terms of impact on functional changes in behavior, or in terms of healthy footwear.

Degree Programme: CHEMISTRY AND MATERIALS TECHNOLOGY

Degree Course: Chemistry and materials technology

Ing. **Ondřej Grulich,** Ph.D.

Date of defence: 16. 4. 2015

Supervisor: doc. RNDr. Petr Ponížil, Ph.D.

Plasma Surface Modification of Biomaterials

Abstract

The dissertation thesis partly summarize using of plasma for surface modification of biomaterials in theoretical part. Experimental part is divided to two sections. In the first section the practical influence of plasma reactor chamber history is discussed. Second section is

focused on polyester or sodium hyaluronate biocompatibility improvement by adding of aminogroups by plasma.

Ing. **Tomáš Matoušek,** Ph.D.

Date of defence: 24. 4. 2015

Supervisor: doc. RNDr. Petr Ponížil, Ph.D.

Analysis of Macrostructure of Polymeric Materials

Abstract

This dissertation thesis "Analysis of macrostructure of polymeric materials" is divided into two main parts. The first of them gives a theoretical background, necessary for understanding the topic and content of the following chapters. The fundamental terms and definitions used in the experimental part are described from the point of acquisition the experimental data as well as their further processing and results interpretation. The focus of the work in the experimental part is concentrated on studying the structure of soft polyurethane foams, namely quantification of their structural (three-dimensional) characteristics - pore size distribution and estimation of mean pore volume from the knowledge of sets of images representing planar cross sections (two-dimensional areas) through such a structure. Experimental data were captured employing the method of X-ray computed micro tomography and evaluated by means of two techniques. The former one was the image analysis method directly implemented in slice-reconstructing software, the latter one was based on Voronoi Tessellations.

Ing. **Jana Polášková,** Ph.D.

Date of defence: 15. 12. 2015

Supervisor: doc. Ing. Věra Kašpárková, CSc.

Influence of Cosmetic Products on the Protective Barrier Function of the Skin

Abstract

Thesis is deals to the current state of the topic. Attention is paid to the pre-treatment of the skin, cosmetic testing and evaluation of the obtained data. The second part of thesis is divided to two parts. The first part deals with the development of methodology for the cosmetic testing and evaluation of the obtained data. The second part of work is thematically divided into four subchapters in order to clearly present the results of the trials looking into the performance and quality of commercially-available and in-house developed cosmetic formulations that have been obtained by bioengineering methods. The first part deals with testing of commercial cosmetic products recommended for the treatment of diabetic foot skin. The second part is focused on the testing of cosmetics intended for the care of atopic skin. Within this study a questionary survey ascertaining people's awareness of this disease was also conducted. The third part of the experimental section deals with testing of the in-house developed formulations (gels and emulsions) containing moisturizers. Formulations with studied active ingredients were evaluated also from the rheological viewpoint. The last part focuses on testing of different emulsion formulations containing panthenol. Besides corneometry, pH and transepidermal water loss measurements, the sensory and rheological evaluation of the formulations were also conducted. The results showed that the efficacy of cosmetic products depends not only on the concentration and type of active ingredients but also on a vehicle in which the substances are applied to the skin. It was also found that in the formulations intended for topical application there is a certain, optimum concentration of the active substance, beyond which no longer increase of efficacy occurs. Results of the work are also important with respect to choosing the appropriate cosmetic products for the treatment of diabetic foot skin and atopic skin.

Degree Programme: FOOD CHEMISTRY AND TECHNOLOGY

Degree Course: Food Technology

Ing. **Martina Hrabalíková**, Ph.D

Date of defence: 22. 4. 2015

Supervisor: doc. Ing. Pavel Valášek, CSc.

Immobilization of Biologically Active Compounds in the Water-soluble Polymer Matrix

Abstract

This thesis deals with immobilization of biologically active compounds, originating from whey, into matrix of water-soluble polymer for preparation of antimicrobial systems with applicability in food industry. A bacteriocine, nisin and lactic acid in combination with polyvinyl alcohol were studied for preparation of antimicrobial foils and microspheres. The description of polyvinyl alcohol-lactic acid interaction in dependence on hydrolysis degree of the polymer, finding of novel way for polyvinyl alcohol crosslinking by nontoxic dicarboxylic acid, and application of four nisin containing modifiers into hydrophilic polymer matrices belong among key outputs of this thesis.

Ing. **Zuzana Kozubková**, Ph.D

Date of defence: 15. 9. 2015

Supervisor: prof. Ing. Antonín Klásek, DrSc.

Structural Modification of Biologically Active Compounds Based on Quinoline

Abstract

Since the discovery of antibacterial effect of nalidixic acid in 1962, large number of congeners was synthesized, which have been examined for their biological properties. Particular attention was dedicated to the compounds based on the quinolone scaffold to synthesize of several new analogs,such as quinolin-4-ones, oxolinic acid and cinoxacin which were active against Gram-negative bacteria. Simultaneously, Japanese scientists introduced 7-piperazinyl-substituted pyridopyrimidine, namely pipemidic acid, which is active against Pseudomonas Auruginosa. There was a milestone in quinoline-based chemoterapeutics represented by the discovery of 6-fluoroquinolones. Since 1980 fluoroquinolones become a major class of synthetic antibiotics with activity against Enterobacteriaceae, Pseudomonas Aeruginosaa and also against Gram-positive pathogens, including Staphylococci and Streptococci. These modifications of drug structures led to the discovery of a further series of active substances such as ciprofloxacin and ofloxacin, which are useful in a wide range of

indications, including those which influence on urinary tract, the respiratory and gastrointestinal tract and skin. Pharmacological studies also showed that 4-oxo-1,4-dihydroquinoline- 3-carboxylic derivatives exhibited excellent activity against HSV-1 and HSV-2, herpes viruses. The aim of this work was to design and examine suitable synthetic methods for preparation of quinolone and quinoline derivatives bearing 1-adamantyl moiety. Methods should meet the technological, ecological and last but not least economic requirements. The first part of this work is dedicated to the introduction of the 1-adamantyl substituent to the nitrogen atom of the amino group in the position 3 of the quinoline-2,4-dione ring and the subsequent transformation of these compounds. It was demonstrated that reaction of 3-chloroquinioline-2,4-dione with 1-adamantylamine was strongly limited by the steric hindrance of alkyl substituent in the position 3. Actually, only 3-methyl-3-chloroquinolin-2,4-diones provided required products. Even in the case of 1-adamantylmethylamine, the situation was very simillar. The yields of these reactions were very poor and usually complex mixtures were obtained disableing further purification. Transformations of prepared amines into more complex heterocyclic structures via reaction with urea in acetic acid failed. The second part is devoted to the construction of the quinoline skeleton from the appropriate precursors via Friedländer cyclization to produce quinolines with 1-adamantyl substituent in the position 4 on the quinoline ring. The convenient method was developped to allow preparation of a wide range of 2,3,4-trisubstituted quinolines. The molecular structure of a number of prepared compounds was determined via X-ray diffraction analyses. Seven quinolines were tested for their fluorescence activity. The results of this work was collected in six publications in SCI journal and in one publication in reviewed journal indexed in SCOPUS.

Ing. **Eva Lorencová**, Ph.D

Date of defence: 30. 4. 2015

Supervisor: doc. RNDr. Leona Buňková, Ph.D.

Factors Influencing Decarboxylase Activity of Genera Lactobacillus and Bifidobacterium

Abstract

The aim of this thesis was to study the factors influencing biogenic amine production by selected bacterial strains of genera Lactobacillus and Bifidobacterium. Mentioned bacterial cultures are commonly used in the manufacture of fermented products. Therefore, the ability of biogenic amine formation is considered to be a negative feature that requires the monitoring. In the frame of the performed measurements the screening of biogenic amine production by cultures (Culture Collection of Dairy Microorganisms Laktoflora, CCDM; Research Institute of brewing and Malting, RIMB) and isolates of microorganisms (cheese production isolates Milcom a.s., Tábor, T0; Human Isolates Collection of Czech University of Life Sciences in Prague, B) including probiotic bacteria was realized. With selected decarboxylase positive strains, able to form detectable amounts of biogenic amines, the experiments by the testing of the factors (pH, temperature, the addition of sodium chloride, carbohydrates or their derivatives, ethanol) were established. The kinetics of aminogenic activity was observed in the growth media and real food matrix. After the derivatization technique by dansyl chloride the samples were measured by the means of RP-HPLC and UV detection. The experimental results cannot be generalized. According to the obtained data, it was observed that contaminant and non-starter culture of lactobacilli were able to produce more abundant concentrations of biogenic amines than starter cultures. Moreover, even between the probiotic strains were found producers of detectable amounts of biogenic amines (Suma biogenic amines <100 mg/l). Selected strains of Lactobacillus (Lb.) and Bifidobacterium were able to form especially tyramine and some polyamines (most often putrescine and spermine). In the frame of above mentioned factors and their concentrations any of them did not cause significant inhibition of the growth. Surprisingly, low pH (4 a 5) and the NaCl addition (0-2 %) did not cause the decrease of biogenic amine concentrations. On the contrary, there was found the support of biogenic amine production. Low cultivation temperature (10+-2 °C) shared for every tested strain a clear influence on the suppression of growth and most of cases on the decarboxylase activity. It should be also highlighted that especially strains Lb. brevis RIBM 2-69 and Lb. brevis T01 can produce high concentrations of tyramine (>200 mg/l) during the cultivation at 30/37+-2 °C and under other observed conditions. The latter tyramine concentrations can present serious potential health risk for consumers. Testing the strains Lb. curvatus T01 and Lb. brevis T02, aminogenic capacity was confirmed in both, in culture media and in milk. However, the real food matrix probably provided less convenient environment for biogenic amine formation process.

Degree Programme: PROCESS ENGINEERING

Degree Course: Tools and Processes

Ing. **Martin Bednařík,** Ph.D.

Date of defence: 3. 6. 2015

Supervisor: doc. Ing. David Maňas, Ph.D.

Possibilities of Influencing the Strength of Bonded Joint at Selected Types of Polymers

Abstract

Bonding is and increasingly used, evolving method for the permanent joints formation. Strength of bonded joint determining the application of this method depends on many factors. Besides the type of adhesive used, properties of the surface layer have considerable influence and therefore a great importance is dedicated to their adjustments and modifications. Radiation crosslinking belongs among important methods for modification of polymers properties. Currently, the most used radiation for crosslinking polymers is ionizing beta radiation, which affects the mechanical properties but also surface properties and chemical and heat resistance. This doctoral thesis examines the influence of ionizing beta radiation on the properties of surface layer of LDPE, HDPE, and PP and on the final strength of bonded joints. The theoretical part describes the basic theory of adhesion and also possibilities of surface properties modification to increase the strength of bonded joints. A significant part is devoted to irradiation of polymers with a focus on ionizing beta radiation. From adhesion theories it follows that to create a good quality bonded joint the surface layer should have a good effectiveness of wetting. This is characterized by low values of the contact angle of wetting. Functional groups (carbonyl, hydroxyl, and others) should exist on the surface layer and bonded material should have a higher surface energy than the wetting liquid (adhesive). In the experimental part of this thesis are described the basic properties of the used materials and adhesives, subsequently, the influence of ionizing beta radiation on the surface properties and on the final strength of bonded joints were studied. In order to assess changes in the properties of the surface layer due to irradiation, contact angle of wetting, surface free energy were measured, and also relative abundance of

functional groups (carbonyl and hydroxyl) was examined. Infrared spectrometry was used for their assessment. From the result of the contact angle measurements it was found that with an increasing radiation dose their values significantly decline. Decrease of the contact angle of wetting brings enormous improvement of the wetting effect of surface layer. Such a decrease was recorded for all the liquids and researched materials. The lowest values of contact angles and the best wettability of the surface layer of LDPE and HDPE were achieved with a dose of 165 kGy. For PP it was a dose of 66 kGy. Values of surface free energy increased extremely with an increasing radia-tion dose. This increase brought an enormous improvement of adhesive properties that had fundamental influence on the final strength of bonded joints. For LDPE and HDPE the most suitable dose, in terms of surface free energy, seems to be 165 kGy due to which its value increased by almost 90 % compared to the unmodified material. For PP it was a dose of 66 kGy for which there was an increase of approximately 60 %. The results of infrared spectroscopy showed that modification by ionizing beta radiation increased the representation of the functional groups (carbonyl, hydroxyl) for all the studied materials. When measuring the strength of bonded joints it was found that with an increasing radiation dose increases their strength. For LDPE and HDPE the biggest increases in strength were detected at higher doses of radiation (from 99 to 198 kGy), while for PP the maximum increase already was reached at the lowest dose of radiation (33 kGy). From the measured results it can be stated that ionizing beta radiation significantly improves wettability, increases the surface free energy and the relative abundance of functional groups. As a consequence of changes in the properties of the surface layer, an enormous increase in the final strength of bonded joints of LDPE, HDPE and PP occurs.

Ing. **Aleš Mizera,** Ph.D.

Date of defence: 7. 9. 2015

Supervisor: doc. Ing. Miroslav Maňas, CSc.

Study of Thermoplastic Polymer Temperature Stability

Abstract

The use of thermoplastic materials is constantly increasing in technical branches. Their indisputable advantage is low weight, good mechanical properties, excellent chemical re-

sistance and low processing temperatures. Relatively low temperature stability belongs to its huge disadvantages. Any improvement of this property can considerably expand the application area of thermoplastic polymers. Among the ways allowing an increase in temperature stability there are various modification methods, above all cross-linking of thermoplastic polymers. The doctoral thesis deals with the influence of radiation cross-linking of thermoplastic materials on their temperature stability. The influence of irradiation dose on temperature stability of radiation cross-linked polymers is examined in this study. Moreover, there is a study of irradiation dose influence on other properties, mainly the influence of repeating temperature load on the products made of radiation cross-linked polymers. This study searches the dependencies between irradiation dose and the properties of radiation cross-linked polymers, especially from the group of polyolefins, with the aim of a more thorough understanding of their mechanical behaviour, temperature stability of selected thermoplastic polymer types and expanding their application in practice. Testing specimens of non-modified and modified PE-LD, PE-HD by Beta (electron) ray in dosage from 0 to 198 kGy with step of 33 kGy were heated for one hour below and above the melting temperature of original material. Mechanical, thermomechanical, thermal and structural tests were performed at ambient temperature (23 °C) after the first and the fifth heating cycle. According to measuring there was confirmed considerable influence of radiation cross-linking on improvement of PE-LD and PE-HD mechanical properties (especially at elevated temperature), as well as increasing temperature stability of PE-LD and PE-HD. Temperature stability depends mostly on cross-linking density, which is rising with increasing dose of radiation. Radiation cross-linking is an important method of thermoplastic modification, therewith we can achieve required properties during very short time. The main advantage is that this process takes place on a final product. This requires another, mainly logistics expenses, which increase price of the final product. Determination of an optimal radiation dose and subsequent changes in behaviour of modified thermoplastics is crucial part of thermoplastic modification by radiation cross-linking.

Ing. **Jan Navrátil**, Ph.D.

Date of defence: 3. 6. 2015

Supervisor: doc. Ing. Miroslav Maňas, CSc.

Study of Modified Thermoplastics´ Utilization Possibilities after the End of their Lifecycle

Abstract

Radiation crosslinking is a technology allowing relatively simple properties customization of polymer materials, which makes it one of the most used modifications. On the other hand, such modified polymer materials cannot be melted repeatedly and this raises a question of their reprocessing. The main purpose of this dissertation thesis is thus defining a possibility of radiation crosslinked polymer materials utilization after the end of their lifecycle and describing properties of newly prepared materials. This dissertation thesis is focused on polyethylenes, which have the highest potential of future recycling. Radiation crosslinked high-density polyethylene was used as filler and both low- and high-density polyethylenes were used as matrix. Five mixture combinations in concentrations from 10 to 60 % were prepared in total. They differed from each other mainly by initial form of both mixture components. Influence of the filler on resulting mixtures behavior was compared considering mechanical, thermal and flow properties. Obtained results shown that mixtures with low-density polyethylene matrix have significant stiffness, strength and hardness increase with increasing filler concentration and softening temperature is increased as well. On the contrary, toughness decreased and flow properties were worsened. These results were supported by structural analysis, which confirmed strong interface formation between the filler and the matrix. Influence on mechanical properties of mixtures with high-density polyethylene matrix is highly dependent on given filler concentration and hence cannot be unambiguously defined. Thermal properties remained unchanged and flow properties were worsened. Structural analysis also confirmed interface formation between both mixture components; however, its strength is also dependent on given concentration.

1.2 Faculty of Management and Economics

Degree Programme: ECONOMICS AND MANAGEMENT

Degree Course: Management and Economics

Mgr. **Roman Asatryan**, Ph.D.

Date of defence: 9. 10. 2015

Supervisor: doc. PhDr. Olga Březinová, CSc.

Corporate Social Responsibility as an Intangible Asset in the Airline Industry in Central and Eastern Europe

Abstract

The global demand for air transport is increasing inspite of some of the detrimental effects of airline operations on various aspects of society. There is a growing interest in socially responsible investments in and by various industries. Consequently, the implementation of Corporate Social Responsibility (CSR) programs that will ensure environmental and social progress as well as the reputation and performance of firms is significant, especially in the airline industry. Within the business model, addressing environmental and social concerns is no longer seen merely as a response to regulators and policy-makers. Rather it is a proactive financial decision. The dilemma faced by firms in the airline industry is how to engage in CSR in the most cost-effective and profitable ways. The main objective of this research is to analyse CSR as an Intangible Asset in the Airline Industry in Central and Eastern Europe. This research is relevant as it will identify the suitable and effective approaches for managing CSR activities of modern airline businesses. The research provides essential factors for the implementation of CSR so as to meet financial, strategic, operational, ecological, and social goals of a firm.

Ing. **Michaela Baňařová**, Ph.D.

Date of defence: 9. 12. 2015

Supervisor: doc. PhDr. Olga Březinová, CSc.

A Model of Consumer Decision-making about his/her Future Education, in Relation to the Student's Willingness to Pay Tuition Fees

Abstract

This dissertation outline analyses issues involved in implementing school fees in Czech tertiary education, this mainly from the consumer's point of view. When purchasing a long-term, fixed-asset-type product such as higher education, the needs, expectations, and requirements of this specific consumer segment are different from those related to everyday consumer goods. Up to now, this topic has never been studied through the prism of micro-economic theory, by analysing the consumer's decision-making process as to whether to purchase or not an asset of a very special nature, such as a tertiary education, in a context of uncertainty, and specifying his/her specific requirements. This is why the author decided to explore this field, combining qualitative and quantitative research methods in order to collect a sufficient pool of information from Business School students and former students for drawing up a model of consumer decision-making about his/her future education, in relation to the student's willingness to pay school fees. In a qualitative study group interview and in pilot study the focus group method were used. Based on our qualitative survey results, a questionnaire was prepared as an appropriate method for quantitative research. Expected correlations and our hypotheses regarding this specific consumer's decision-making process will be submitted to statistical tests (e.g., Mann-Whitney U-test, Pearson chí-squared test, Spearman correlation or Kruskal-Wallis test); the results will make it possible to draw conclusions and define a decision-making model for a consumer of tertiary education at regionally-oriented business schools. The reasons for selecting this particular topic are presented in some detail at the beginning of the outline, as well as the inclusion/exclusion criteria for respondents and institutions to be analysed. These are followed by a chapter describing the present situation in the field; possible theoretic assumptions are also suggested. The following chapters formulate the key aims of the research, research questions, hypotheses and methods, research´s results, the study's benefits for theory and real life, a list of expected limiting factors, and an outline of how the study should be continued.

Ing. **Jana Bilíková**, Ph.D.

Date of defence: 23. 6. 2015

Supervisor: prof. Ing. Ján Porvazník, CSc.

Applying the Principless of Holistic Competence in the Environment of Small and Medium Enterprises

Abstract

The dissertation deals with the options of applying the principless of holistic competence of management to the Human Resources practises in an environment of small and medium enterprises in the Zlín Region. It responds to the current problems of society as a whole, the in/competence of managers of enterprises and it also highlights the need to ensure the effective selection of suitable candidates for managerial positions using the principles of holistic competency of management in the process of tendering. The main aim of the dissertation is based on an analysis of currently available theoretical knowledge in the field of holistic management and field research to develop a proposal for the application of the principles of holistic expertise in tendering process within the management positions in terms of small and medium-sized enterprises in the territory of the Zlín Region.

Ing. **Radek Blahuš**, Ph.D.

Date of defence: 7. 12. 2015

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

Impact of Organizational Factors on the Production Process of Innovative Proposals for Blue-collar Positions in Manufacturing Companies

Abstract

Doctoral thesis deals with the support of blue-collar workers in the production of process-innovation suggestions and with the influence organisational factors have on this production. The main objective of this work is to propose recommendations for encouraging blue-collar workers in production of process-innovation suggestions in manufacturing companies. A literary research had been carried out to achieve this objective. Subsequently, theoretical framework for the practical part of the thesis were defined; experimental hypotheses

and a methodology of the research were set. The research area was narrowed down to companies from the automotive sector for the purposes of the practical part of this thesis. Data were obtained using questionnaire research with 391 respondents, semi-structured interviews with 19 respondents and a consultation of the results with an expert from a manufacturing company. hypotheses were verified using the acquired knowledge, the model of production of process-innovation suggestions was developed and recommendations for creation of the system encouraging blue-collar workers in production of process-innovation suggestion were proposed (laid down, pokud doporučení stanovena, ne navržena). This model and recommendations were then consulted with an expert in order to assess feasibility of their practical implementation within a large manufacturing company. Finally, a synthesis of academic contribution of the doctoral thesis and the practical applicability of the discovered findings in the sector of manufacturing companies was carried out. The existence of the described encouragingsystem in a company, management support, sufficiency of resources and expected benefit for improvers (such as expected reward, expected improvement of working environment or expected feedback) have been identified as the main factors supporting the production of process-innovation suggestions from blue-collar workers.

Mgr. **Milan Hnátek**, Ph.D.

Date of defence: 29. 4. 2015

Supervisor: doc. Ing. František Lipták, DrSc.

Role of Communication in System of Small and Medium Sized Family Enterprises with Aim of Successful Multigenerational Development

Abstract

The doctoral thesis deals with working, managing and planning of generational transition in management of small and medium sized family businesses with emphasis on proper communication between current and upcoming generations. The goal of this dissertation thesis is to introduce new approaches to the family business research with focus on succession planning, generation exchange and preparation of the future successor in management of the family business.

Ing. **Monika Horáková,** Ph.D.

Date of defence: 9. 10. 2015

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

The Current Trends in Consumer Behaviour of College Students in the Terms of the Czech Republic

Abstract

This dissertation concentrates on consumer behaviour of students in the Czech Republic. It focuses on the field of economic theory dealing with consumer behaviour that is still undergoing numerous innovations on the microeconomic as well as macroeconomic level. The main research aim is to introduce a microeconomic consumer model regarding decision-making about the time allocation. The new model concentrates on a specific consumer - a university student. A number of people entering the tertiary education is increasing in many developed economies, which is the fact being referred to by EU and its contemporary strategic targets. Although it is a significant consumer segment, many differences reflecting certain heterogeneity within the group of these individuals exist. Every student - consumer has 24 hours available that he or she diversifies according to personal preferences into the following three areas. The first research area is connected with consumer behaviour that is determined by a disposable income. The second research area includes home production and the third research area focuses on free time activities including sleeping time. The acquired typology of a university student - consumer served as a source for the final recommendation regarding the practical use from the business practice perspective, mainly for organizations of retail sale, restaurants, or culturally and socially oriented organizations.

Ing. **Denisa Hrušecká,** Ph.D.

Date of defence: 29. 4. 2015

Supervisor: prof. Ing. Felicita Chromjaková, PhD.

Theory of Constraints Based Information Systems for Production Planning and Scheduling and Their Impact on Production Process Performance

Abstract

This dissertation is focused on research activities regarding advanced production planning systems which use planning algorithms based on basic principles of Goldratt´s Theory of Constraits. The main goal is to determine basic principles to achieve a better impact of the implemented advanced production planning system on the total production process performance.

Ing. Mgr. **Patrik Jangl,** Ph.D.

Date of defence: 7. 12. 2015

Supervisor: doc. Ing. Miloslava Chovancová, CSc.

Market Orientation of Firms and its Measurement

Abstract

The dissertation deals with the marketing concept of market orientation. The aim was to create a valid model of market orientation of Czech and German hightech companies in the manufacturing sector with the emphasis on current trends in management and marketing. The relationship between market orientation, innovations and company performance was empirically examined. Invariance of the Czech and German model was also tested. The main methods of data analysis that led to the achievement of the objectives were exploratory and confirmatory factor analyses, and correlation and regression analyses. The constructed and modified model of market orientation measurement is to be considered the most significant benefit of the dissertation. Furthermore, creation of the regression and structural model of ?market orientation ? innovations? and ?market orientation - company performance? including a comparison of the Czech and German models are also of high importance. The results of this work will contribute to a better understanding of the concept of market orientation in our cultural settings, both on the theoretical and practical level.

Ing. **Martina Kubíčková,** MBA, Ph.D.

Date of defence: 23. 6. 2015

Supervisor: prof. Ing. Ján Porvazník, CSc.

Effectiveness of Communication between Parent Multinational Companies and their Subsidiaries and its Impact on Improving their Performance

Abstract

This dissertation deals with the issue of multinational parent companies and their subsidiaries communication and the influence of communication on the performance of these companies. The work focuses on the use of various types of communication in society and on the barriers that act against its smooth running thereby they complicate it. The main objective is to create a set of findings that are practically applicable for multinational corporations to communicate effectively with their subsidiaries and for subsidiaries with their parent companies.

Maia Ozdemir, Ph.D.

Date of defence: 29. 4. 2015

Supervisor: doc. Ing. František Lipták, DrSc.

Intercultural Marketing and Communications: An Implementation on Housing In Turkey, Czech Republic and Russia

Abstract

As "a source of energy " for economic surge, innovation always was an important factor in economic development (SCHUMPETER, 2012) and therefore, was a popular topic for academic research. In the light of actual economic problems such as globalisation, increased migration and multiculturalism, the modern economic innovation literature would benefit from knowledge of migrants' overall cultural characteristics and migrant consumers' cultural preferences particularly.

Ing. **Michal Pivnička**, Ph.D.

Date of defence: 6. 10. 2015

Supervisor: doc. Ing. Rastislav Rajnoha, Ph.D.

Balanced Scorecard in Information Technology

Abstract

This dissertation is focused on research activities regarding strategic management with a focus on the information technology for the supporting of the Balanced Scorecard methodology. The main aim of this work is to define the basic characteristics of the enterprise environment, define the core competencies of the firm for the successful implementation of the corporate strategy, to determine the places of synergies between computer support and the Balanced Scorecard methodology. The output of this work is the design of system model of the interactions between the corporate environment and strategic management using Balanced Scorecard methodology in the use of computer software designed to support it. The next output is defining bottlenecks in the use of these applications with regard to the criteria laid down.

Ing. **Pavlína Pivodová**, Ph.D.

Date of defence: 6. 10. 2015

Supervisor: doc. Ing. Roman Bobák, Ph.D.

The Impact of Industrial Engineering and Project Management on the Creation of Process and Organizational Innovations

Abstract

Submitted dissertation thesis deals with the issue of industrial engineering and project management during the creation of process and organizational innovations. The issue is tackled by the research within environment of Czech companies. The main goal of the thesis is to develop methodical procedure for the application of process and organizational innovations in a production process. Introduction of the thesis describes current state of the issue. Next follows description of the research areas which provide background for the conducted research of the dissertation. These areas include fields of improvement and innovations, production process and its metrics. In the following part are defined goals, research questions and hypotheses of the dissertation theses. The part continues with research methods which lead to answers on research questions and hypotheses verification. Outputs are shown in the results of the dissertation and they consist of results of both quan-

titative and qualitative research together with the results of thirty three projects and three specific case studies. These results provide the input to the development of the methodical procedure for the application of process and organizational innovation of a production process. Methodical procedure is formulated as a process model on the basis of project approach and steps of DMADVIC model. The final part is dedicated to the benefits of the dissertation for the theory and the practice.

Ing. **Lukáš Trčka**, Ph.D.

Date of defence: 6. 3. 2015

Supervisor: doc. Ing. Ludmila Hromková CSc.

Process Management of University Education

Abstract

The submitted theses of dissertation are the basic ideas dissertation focused on the issue of process management in terms of university education. The author's research was focused on the conversion of process management methodology principles from commercial enterprises to Czech university education environment. The main goal of this work is the proposal of process model in university education based on research values for defined segments from external customers of the educational process. Proposed processes focus on the quality of the process output as well as the cost aspect. The work is divided into seven chapters. Introduction describes the rationale for the choice of subject and author's personal motivation for developing this area. The following is a description of the current state of knowledge of the issues addressed, which is the retrieval of domestic and foreign literature and electronic resources. The second section specifies the main objective and sub-objective work, followed by a presentation of the research questions. Methodological processing is described in the Methods section of dissertation thesis. Based on the analysis presented in chapter Main results of the dissertation are formulated benefits for science, practice and education. The last chapter before the final summarization is an outline of continuing research activity.

Degree Programme: ECONOMIC POLICY AND ADMINISTRATION

Degree Course: Finance

Ing. **Lubor Homolka**, Ph.D.

Date of defence: 9. 12. 2015

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

Utilization of Advanced Analytical Quantitative Methods for Measuring Companies' Performance

Abstract

Important findings from the economics perspective and related fields of study are presented in beginning. This part points to various definitions, systems and objectives (i.e., purpose of accounting figures in different accounting systems) which appear in literature and which need to be considered in the initial phase of model building process. Core principles and methods of modern data analysis are reviewed in the following chapter. This part refers to various disciplines, such as probability theory, information theory, statistical analysis (from both standard and Bayesian perspective), machine learning and artificial intelligence techniques. Following part contains goal and objectives. Methodical approach is described in the following chapter. Main results section contains demonstrations of selected analytical approaches. The conceptual model is presented in the beginning of the chapter. The last chapters discuss achieved results and highlight contributions to theory and practice.

1.3 Faculty of Multimedia Communications

Degree Programme: VISUAL ARTS

Degree Course: Multimedia and Design

MgA. **Zuzana Bahulová**, Ph.D.

Date of defence: 23. 6. 2015

Supervisor: prof. Ondrej Slivka, ArtD.

Development of a New Product Using 3D Scanner Technology

Abstract

The main task of the dissertation is develop a new product using a 3D scanner technology, the process of creating documenting through the animation make more popular. Furthermore, to focus and to explore the possibility of using these new technologies in the animation industry and find their advantages and disadvantages, and outputs of them to use in an animated documentary. Finally, the role of the animated document target in the film industry.

Aleksandar Donev, PhD.

Date of defence: 7. 12. 2015

Supervisor: doc. PhDr. Zdeno Kolesár, Ph.D.

Typography in Advertising

Abstract

This thesis is set to investigate the use of type and typography in advertising, the role of typography in rendering the advertising message and the effects it has on the same. The approach undertaken in this thesis is mainly theoretical, including statistics, a survey, a case study and an analysis of literature from various sources in the field of the research. I have analysed the factors that make typography suitable and effective for advertising purposes.

MgA. Bc. **Libor Nemeškal**, PhD.

Date of defence: 23. 6. 2015

Supervisor: prof. MgA. Ľudovít Labík, ArtD.

Film Editing Analysis of the Czech New Wave: Films by Director Hynek Bočan

Abstract

Although the issue of the Czech New Wave might seem frequently reflected by film historiography and criticism, the topic of its editing, perceived through the analysis of individual works and potential common trends, has been relatively neglected. The author of the text is trying to fill this gap and continue with his project of mapping Czech film history using the context of film editing and dramaturgy. He focuses specifically on film editing analysis of movies by director Hynek Bočan, who is ? in association with the phenomenon of the Czech New Wave ? often pushed into the background or even completely neglected. An integral part of the thesis is also a re-cut of the TV series Záhada hlavolamu directed by Bočan into a feature film and a thematic collection of audiovisual works in a minimum length of 60 minutes.

1.4 Faculty of Applied Informatics

Degree Programme: ENGINEERING INFORMATICS

Degree Course: Automatic Control and Informatics

M.Sc. **Juan Carlos Beltrán Prieto**, PhD.

Date of defence: 26. 3. 2015

Supervisor: prof. Ing. Karel Kolomazník, DrSc.

Treatment of Glycerol Fraction

Abstract

The recent increase in the amount of surplus glycerin as a result of biodiesel production has caused an intensive research aiming to find new applications for glycerin with special interest in the development of value added products. In this work, the partial oxidation of glycerin on platinum electrodes in presence of manganese dioxide (MnO2) by electrochemical methods was performed by means of cyclic voltammetry and multiple pulse amperometry techniques. The case of controlled oxidation of glycerol using nitrous oxide was also analyzed and explained. A method for the identification and quantification of glycerin oxidation products was developed by High Performance Liquid Chromatography (HPLC). Proposal of analytical solutions of some deterministic models of glycerol oxidation was performed. The determination of the physical mathematical model for glycerol oxidation,

performance of the linearization of the proposed model and determination of transfer function for control purposes was achieved. Agreement between numerical data (from mathematical modeling), experimental data and output using the respective transfer function and impulse input was observed. As a result, the determined transfer function of the system demonstrated to fully describe the proces.

Mgr. **Hana Vašková**, PhD.

Date of defence: 26. 8. 2015

Supervisor: prof. Ing. Karel Kolomazník, DrSc.

Modeling of Chemical Reactor for Leather Waste Dechromation

Abstract

Human health and considerate approach to the environment are very current topics nowadays. Both are inseparably related to the waste of leather industry management and their efficient processing. The content of the thesis follows two main lines - mathematical modeling of the hydrolysis process, including the optimization of the main operating costs for the production of hydrolyzate and its yield and experimental identification of the harmful substances contained in products of leather industry related to the issue of carcinogenic hexavalent chromium using standard spectrophotometric method and Raman spectroscopy as an innovative method. The modeling is based on a description of the key parts of a production system for the processing of leather wastes to effectively useful collagenous protein hydrolyzate and hydrolysis kinetics of the process itself. The mathematical-physical model of the collagen waste hydrolysis process was proposed on the basis of balance equations, its linearization was carried out and transfer function for control purposes was achieved. Performed simulation of the model corresponds to the physical behavior of the system. Experimental part is devoted to valence of chromium in leather samples identification, including warnings of possible risks in the treatment of leather goods, especially shoes, by products containing oxidizing agents. The results achieved provide a comprehensive view of the issues being resolved.

Degree Programme: ENGINEERING INFORMATICS

Degree Course: Engineering Informatics

Ing. **Martin Kolařík**, PhD.

Date of defence: 20. 10. 2015

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

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

Abstract

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

Ing. **Lucie Pivničková**, PhD.

Date of defence: 17. 12. 2015

Supervisor: prof. Ing. Vladimír Vašek, CSc.

Expert System for Diagnosis of Human Balance System Disorders

Abstract

This doctoral thesis deals with proposal of a supporting expert system for evaluating examination results measured on static posturography platform. The system should serve as a

support tool for outpatient ENT physicians in the diagnostics of patients with balance disorder. The base for the creation of the expert system was the differential diagnosis of balance disorders that is clear differentiation between peripheral and central vestibular syndrome and the exclusion of non-vestibular vertigo. This supporting diagnostic system is uses fuzzy logic with a combination of the golden section from the measured data. This thesis also deals with the application of the Wii Balance Board in ENT surgeries. This platform provides an affordable device for screening examinations. A new software application has been developed to test the platform and use it further in ENT surgeries. This application records measurements and calculates numerical values quantifying them based on the online communication with the platform. Finally, the expert system logic implemented into the application suggests possible diagnoses to the ENT physician.

Ing. **Michal Šmiraus**, PhD.

Date of defence: 10. 6. 2015

Supervisor: doc. Ing. Zdenka Prokopová, CSc.

Research on Optimization Methods of Semantic Web Using Ontologies

Abstract

The information provided on the global network WWW (World Wide Web) currently include a lot of information and documents which are although largely comprehensible to people, but has been less clear for automated search engines which are currently unable to satisfactorily identify precisely what the content of this page in terms of its importance expresses. Along with the increasing amount of information available on the global Web network so there is a need to effectively identify, recognize, and process the relevant information not only on the basis of a simple full-text search using key words, but also on the basis of knowledge bases using Semantic Web technologies and ontologies, designed on the one hand, the general development languages, methodologies and software tools, but on the other hand, also design their own ontologies describing various substantive areas even applications that will use them.

Ing. **Radek Vala**, PhD.

Date of defence: 20. 10. 2015

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

Methods of Application Development with Adaptive Displaying System for Mobile Platforms

Abstract

Mobile application development is currently one of the most active software engineering areas. Besides standard native development methods that are based on software development tools supplied by the manufacturer of the operating system, there are also non-standard development methods, so-called hybrid methods, which are very interesting in terms of crossplatform mobile applications development. Hybrid methods are currently very often discussed and connected with competitiveness of developer companies. This doctoral thesis addresses specifically the web-based hybrid mobile applications whose main advantage is the high percentage of source code, which is common to multiple platforms. The aim of the experimental part is to create innovative, reproducible, and time-consuming and financially balanced methods of web-based hybrid application development. There are defined serious development issues and on the basis of measurements and application tests, real solutions are recommended.

2 DEFENDED HABILITATION THESES

In 2015, 5 habilitation theses were defended: 2 at the Faculty of Technology, 2 at the Faculty of Management and Economics and 1 at the Faculty of Applied Informatics.

2.1 Faculty of Technology

Course: Technology of Macromolecular Compounds

doc. PhDr. **Martin Mellen**, PhD.

Appointed with effect from: 1st October 2015

The Effect of Natural Feed Additives for the Production and the Quality of Chicken Meat

Abstract

The aim of the habilitation thesis was to investigate the impact of the application of different doses of phytoadditive substances into feed mixture and water of chickens fattening hybrid combination Cobb 500 to body weight, microbial colonization of the gastrointestinal tract (caecum), nutritional value of the most valuable carcass parts (breasts, thighs) and sensory evaluation of the most valuable parts of the chickens carcass (breasts, thighs). By application of different phytoadditve substance doses into complete feed mixtures and water in the chickens diet we achieved higher chickens body weight at the end of feeding (42 days) in all experimental groups, to which were added various phytoadditive substances. The highest body weight (2078.09 g) compared to the control group (1813.27 g) was found in the group with Biocitra addition applied in the water in the amount 1.0 ml.l-1 produced as a mixture of ascorbic acid with citrus bioflavonoids. The positive effect of phytoadditive substances was confirmed in our experiment, at which we achieved an increase of the beneficial bacteria number after application of natural additives in the experimental groups compared to the control group. The chemical composition of the most valuable parts of the Coob 500 carcass chickens was not affected after application of phytoadditive substances. We determined relatively balanced protein content, but higher content of intramuscular fat in the control group (1.21 g.100-1) in the breast muscle compared to the treatment groups (0.48 to 0.69 g.100-1). The protein content of the thigh muscle in all experimental groups was observed as balanced and similar results were found also in fat

content. Sensory evaluation of the breast muscle showed that the flavor and taste of the meat after and without phytoadditive substances application was balanced, but juiciness and softness was often higher in the experimental groups, except of the group with application of Agolin Tannin Plus to feed mixture. From an economic point of view we can conclude that the application of phytoadditive substances has very good influence to the chicken economics production, due to the better feed conversion and the European index of productive efficiency of fattening in experimental groups compared to the control. On the basis of our assessment was state that as the best Agolin Poultry and Biocitro phytoadditive substance were confirmed from the view of performance parameter, chemical and sensory parameters as well.

doc. Ing. **Vendula Pachlová**, Ph.D.

Appointed with effect from: 1st October 2015

The Importance of Proteolysis during Cheese Ripening

Abstract

Habilitation thesis deals with the importance of intensity of proteolytic process in natural cheese. Textural properties and also amino acid content were affected by storage conditions during cheese ripening. The importance of proteolysis in natural cheese as raw material during processed cheese production was also evaluated. Intensity of proteolysis could significantly affect properties of processed cheese. Habilitation thesis focuses on effect of proteolysis on food safety of fermented and unterfermented food an beverage. If decarboxylase positive microorganisms are presented in food, biogenic amines could cause serious problems. Thesis provides detailed description of qualitative characteristic trends depending on storage conditions in model cheese during ripening. Thesis also paid attention to assessing of biogenic amine content in selected food and raw materials, which can contain high amounts of biogenic amines.

2.2 Faculty of Management and Economics

Course: Enterprise Management and Economics

doc. Ing. **Adriana Grenčíková**, Ph.D.

Appointed with effect from: 1st March 2016

Trends in Business Policy of Employment

Abstract

Thesis aimed at trends in the employment of people in the company. Bussiness enviroment where the companies operate is exposed to constants changes caused by development of communication technic, new technologies, etablishment of new applications, global processes, political and economical changes.

Employment policy as well as the area of HR starts undergoing with significant changes. On the labor market comes a new generation of employees who grew up with the development of communication technologies, confesses a different lifestyle than previous generations. Many people from this generation are becoming employers and provide new approaches to employing people that are different from the existing traditional methods of employment. The emphasis is on a balanced personal and professional life as well as creating a personal relationship to the job position and the company. For these reasons, it is necessary to deal with trends in employment and emphasis on the analysis of all the influences that affect to the performance of the workforce. Setting up access to employees on corporate employment policy focuses on performance management. Since the workforce is aging and population decreasing in the EU, it is necessary to focus and develop skills and abilities of employees whose company has available, since the searching for the new talented empoyees will be increasingly difficult.

In the presented work we analyse current condition of the solved topic by the domestic and foreign authors. We define a theoretical approach to these issues. For a sample of the Slovak companies we analyze the impact of the internal and external environment for the employment of people in companies. We define the trends in employment in Slovak companies and compare them with the new trends in international employment. We present theo-

retical and practical inaugurual dissertation assets of the labor employment issues in the companies.

doc. Ing. **Michal Pilík**, Ph.D.

Appointed with effect from: 1st April 2015

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

Abstract

The habilitation thesis aims to analyse the issue of online shopping behaviour on B2C markets in the Czech Republic. It summarizes the results of quantitative and qualitative research conducted among online customers form June 2012 to December 2013. Both surveys were focused on finding shopping habits of ultimate customers on B2C markets.

The thesis provides a comprehensive oveview of the specifics of online markets and e-customers. It describes in detail the digital economy together with current trends and specific in online shopping in the Czech Republic. It further summarizes the advantiges and disadvantiges of online shopping and presents briefly the development of Czech e-shops and e-commerce market in the Czech Republic in general. Part of the thesis deals with the marketing mix, or more precisely, its electronic form, and specifics and differences between the traditional 4Ps and 4e-Ps. Given the nature of online shopping, the habilitation thesis describes the basic concepts that are taken into account in many studies focusing on online shopping behaviour, namely trust, loyalty, quality and security.

More than 80 % of Internet users buy online in the Czech Republic and the Internet is becoming almost a traditional point of purchase. And for this very reason the research analyses the status quo of customers online buying behaviour on e-commerce markets in the Czech Republic and based on the primary and secondary data analysis suggests a possible profile of customer online buying process. Furthermore, the aim of the thesis is also to identify factors that influence customer buying behaviour.

In conclusion, the thesis attempts to predict the development of e-commerce on the Czech online market. It introduces a model of customer online buying behaviour, which emerged

from the current model of customer buying behaviour on B2C markets, and based on the research results was adapted to online shopping environment.

2.3 Faculty of Applied Informatics

Course: Machine and Process Control

doc. Ing. **Jiří Vojtěšek**, Ph.D.

Appointed with effect from: 1st June 2015

Effective Method of Nonlinear and Adaptive Control of Process

Abstract

This work deals with the control of technological processes based on the combination of one method of the nonlinear and the adaptive control. The goal of this thesis is to show that this combination of two control strategies could improve the quality of the control compared to the classical adaptive control. The block oriented approach is employed for the construction of the nonlinear adaptive controller with separated static nonlinear and dynamic linear parts. The order of these two parts is described by the so called Wiener or Hammerstein model. This work uses the Wiener model where the first block represents the static nonlinear part and the second block is the dynamic linear part. The static nonlinear part comes from the measured or simulated static characteristic of the controlled system and the dynamic linear part is equal to the classic adaptive controller. The advantage of this nonlinear adaptive control method is that it can be used for systems where the measurement is the only way how to obtain static characteristic of the system which cannot be described by a mathematical model or its modelling is difficult. The proposed control method was tested on the mathematical model of the continuous stirred tank reactor as a typical member of the systems with lumped parameters. Obtained results are also compared with the results of simulations of the classical adaptive control.

3 QUALIFYING LECTURES FOR PROFESSORSHIP

3.1 Faculty of Management and Economics

Course: Enterprise Management and Economics

prof. Ing. **Jaroslav Belás,** PhD.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 25th November 2014
Appointed with effect from: 1st May 2015

Theoretical Attributes of Management and Economics of Commercial Bank in Position of Specifical Form of Business

Abstract

The lecture deals with the issues of management and economics of commercial banks. Commercial bank is a specific enterprise, which differs from other firms that use money as a business objective, has an atypical structure of assets and liabilities and work in conditions of strict regulation. Commercial Bank operates with the highest degrees of financial risk because through its products it transforming „safe money" of depositors at high risk loans. At the same time it is also working with a very small volume of equity capital.

The lecture analyzes bank management in the context of performance management and risk management in commercial bank. There is also a detailed discussion on the issue of capital adequacy of banks, credit risk management and client relationship management.

As a part of the lecture there is an introduction of the concept of scientific activity, defining contribution to the evolving of science of teaching and presenting concepts of commercial banking in bachelor, master and doctoral study program at the Faculty of Management and Economics, Tomas Bata University in Zlin.

prof. Ing. **Miroslav Žižka,** PhD.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 12th May 2015
Appointed with effect from: 1st November 2015

Multi-criteria approaches to the evaluation of corporate performance

Abstract

The lecture is focused on measuring corporate performance. This is a current topic that is not clearly defined in the literature both in terms of terminology and methodology. The performance of a company has two basic dimensions – effectiveness and efficiency. Measures of effectiveness assess the company's ability to achieve predetermined goals and objectives. Efficiency reflects the company's ability to achieve outputs with minimum inputs. The principle of performance is the creation of value in order to achieve continuity of existence of the company. A variety of methods can be used for the performance measurement, from simple ratios to multi-criteria methods. The research described in the theses was based on the use of Data Envelopment Analysis (hereinafter DEA) which ranks among the methods of a multi-criteria decision-making. DEA represents a specialized non-parametric model tool designed to assess the efficiency and performance of homogenous decision-making units based on a large number of different inputs and outputs. The aim of the research was to evaluate the performance of innovative companies in the Czech Republic in the manufacture of motor vehicles, trailers and semi-trailers. Corporate performance was evaluated both in terms of individual dimensions (effectiveness, efficiency), and in terms of the total performance. Hence, a two-stage method of DEA was used. The first stage assessed expending resources in order to achieve the protection of industrial property rights and the second stage assessed whether the company was able to evaluate protected industrial property rights in the form of added value, that is, whether it acted effectively. Performance score was determined by multiplying the scores of effectiveness and efficiency. In the last stage, evaluated companies were divided into a matrix containing four fields according to the relationship between efficiency and effectiveness. Correlation analysis between the scores of the effectiveness, efficiency and performance proved the existence of a relatively strong, direct and statistically significant correlation between effectiveness and efficiency and even stronger direct relationship between efficiency and performance. This may imply that companies can improve their performance by improving the effectiveness in terms of the protection of industrial property rights. Equally, companies can im-

prove their performance by improving efficiency in terms of better commercialization of registered industrial property rights. The integration of DEA method in the Balanced Scorecard (hereinafter BSC) is another potentially interesting research direction. DEA method can be used only partially within the BSC, for example to evaluate just one perspective (typically financial), or to transform a large number of indicators in individual perspectives to the global performance score. Last part of the thesis contains the concept of research and teaching in the field. The concept of a scientific work is based on the formulation of the supporting research focus which is in line with educational disciplines of author's faculty and directs professional specialization of departments and their activities.

4 IMPORTANT SCIENTIFIC AND SPECIALIZED ASSIGNMENTS

4.1 Projectst financed by the Czech Science Foundation (GACR)

In 2015, 7 projects financed by the Czech Science Foundation were implemented at the TBU in Zlín. Total eligible costs amounted CZK 6,294 thousand for TBU in Zlín in 2015.

4.1.1 Faculty of Technology

Standard projects

GA13-08944S Interactions of Conducting Polymers with Cells
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Ing. Petr Humpolíček, Ph.D. (implemented within CPS and FT)
Project co-investigator: Institute of Macromolecular Chemistry of Academy of Sciences of the Czech Republic
Implementation period: 2013 - 2015

Total project cost (CZK thous.):	11 860
Total project cost – TBU (CZK thous.):	6 829
Project cost of TBU in 2015 (CZK thous.):	2 235 (FT – 125 CZK thous, CPS – CZK thous 2,110)

4.1.2 Faculty of Management and Economics

Postdocs grants

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

Total project cost (CZK thous.):	623
Total project cost – TBU (CZK thous.):	623
Project cost of TBU in 2015 (CZK thous.):	202

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

Total project cost (CZK thous.):	707
Total project cost – TBU (CZK thous.):	705
Project cost of TBU in 2015 (CZK thous.):	222

4.1.3 Faculty of Applied Informatics

Projects where TBU acts as a co-investigator

Standard projects

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

4.1.4 Faculty of Humanities

Standard projects

GA13-04121S Understanding the Mechanism of Self-Regulation in Children and Minors in Institutional Care
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Mgr. Soňa Vávrová, Ph.D.
Implementation period: 2013 - 2015
Total project cost (CZK thous.): 2 323
Total project cost – TBU (CZK thous.): 2 323
Project cost of TBU in 2015 (CZK thous.): 754

4.1.5 University Institute

Postdocs grants

GP14-32114P The modification of magnetic filler and the study of its use in magnetorheological systems
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Ing. Michal Sedlačík, Ph.D.
Implementation period: 2014 - 2016
Total project cost (CZK thous.): 1 532
Total project cost – TBU (CZK thous.): 1 532
Project cost of TBU in 2015 (CZK thous.): 504

Junior grants

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

Total project cost – TBU (CZK thous.): 5 765
Project cost of TBU in 2015 (CZK thous.): 1 897

Standard projects

GA13-08944S Interactions of Conducting Polymers with Cells
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Ing. Petr Humpolíček, Ph.D. (implemented within CPS and FT)
Project co-investigator: Institute of Macromolecular Chemistry of Academy of Sciences of the Czech Republic
Implementation period: 2013 - 2015
Total project cost (CZK thous.): 11 860
Total project cost – TBU (CZK thous.): 6 829
Project cost of TBU in 2015 (CZK thous.): 2 235 (FT – 125 CZK thous, CPS – CZK thous 2,110)

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

In 2015, 2 projects financed by the Ministry of Industry and Trade of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 1,270 thousand for TBU in Zlín in 2015.

4.2.1 Faculty of Technology

Projects where TBU acts as a co-investigator

FR – TIP Programme

FR-TI4/623 *Nanostructured packeging materials of exceptional properties and easier recycling
Principal investigator: SYNPO, akciová společnost
Project investigator on behalf of TBU: Ing. Dagmar Měřínská, Ph.D.
Implementation period: 2012 – 2015
Total project cost (CZK thous.): 20 692
Total project cost – TBU (CZK thous.): 2 070
Project cost of TBU in 2015 (CZK thous.): 295

4.2.2 Faculty of Management and Economics

The Operational Programme Enterprise and Innovations (OP PI)

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

Implementation period: 2014 - 2016
Total project cost (CZK thous.): 1 300
Total project cost – TBU (CZK thous.): 1 300
Project cost of TBU in 2015 (CZK thous.): 975

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

In 2015, 20 projects financed by the Ministry of Education, Youth and Sports of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 188,595 thousand for TBU in Zlín in 2015.

4.3.1 Faculty of Technology

Operational programme Education for Competitiveness (OP VK)

CZ.1.07/2.2.00/28.0132 Increasing exclusiveness of tuition of technologies of fats, cosmetics and detergents
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. Rahula Janiš, CSc.
Implementation period: 2012 - 2015
Total project cost (CZK thous.): 20 071
Total project cost – TBU (CZK thous.): 20 071
Project cost of TBU in 2015 (CZK thous.): 424

Projects where TBU acts as a co-investigator

VES 15 EUREKA CZ Programe

LF15016 Research and development of a system for acquiring data to predict the speed of growth of children's feet
Principal investigator: ISSA CZECH s. r. o.
Project investigator on behalf of TBU: Ing. Jitka Baďurová, Ph.D.
Implementation period: 2015 - 2018
Total project cost (CZK thous.): 9 846
Total project cost – TBU (CZK thous.): 1 664
Project cost of TBU in 2015 (CZK thous.): 317

4.3.2 Faculty of Management and Economics

Operational programme Education for Competitiveness (OP VK)

CZ.1.07/2.3.00/20.0147 Development of Manpower in the Research Field of Performance Measurement and Operation, Companies, Clusters and Regions
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: prof. Dr. Ing. Drahomíra Pavelková

Implementation period: 2012 - 2015
Total project cost (CZK thous.): 24 047
Total project cost – TBU (CZK thous.): 24 047
Project cost of TBU in 2015 (CZK thous.): 6 495

CZ.1.07/2.2.00/28.0012 Innovation of Education in Regional Development
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. RNDr. PhDr. Oldřich Hájek, Ph.D.
Implementation period: 2012 - 2015
Total project cost (CZK thous.): 11 844
Total project cost – TBU (CZK thous.): 11 844
Project cost of TBU in 2015 (CZK thous.): 498

CZ.1.07/2.2.00/28.0161 A Complex Finalization Project of Study Programs Innovation Period by Participation of Specialists from Intership or Abroad by Increase of Language and ICT Competence
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. Michal Pilík, Ph.D.
Implementation period: 2013 - 2015
Total project cost (CZK thous.): 14 240
Total project cost – TBU (CZK thous.): 14 240
Project cost of TBU in 2015 (CZK thous.): 2 000

4.3.3 Faculty of Applied Informatics

Operational Programme Research and Development for Innovation (OP VVI)

CZ.1.05/2.1.00/19.0376 CEBIA-Tech Instrumentation
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: prof. Ing. Vladimír Vašek, CSc.
Implementation period: 2015
Total project cost (CZK thous.): 51 059
Total project cost – TBU (CZK thous.): 51 059
Project cost of TBU in 2015 (CZK thous.): 51 059

Operational program Education for Competitiveness (OP VK)

CZ.1.07/2.3.00/30.0035 Development of Human Resources in Scientific and Research Activities at Tomas Bata University in Zlin
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: prof. Ing. Vladimír Vašek, CSc.
Implementation period: 2013 – 2015
Total project cost (CZK thous.): 9 949
Total project cost – TBU (CZK thous.): 9 949
Project cost of TBU in 2015 (CZK thous.): 3 449

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 2015 (CZK thous.):	28 764

4.3.4 Faculty of Humanities

Operational program Education for Competitiveness (OP VK)

CZ.1.07/2.3.00/45.0015 Centre for the Support of Science and Engineering: Technical and Scientific Laboratory for Children and Youth in Zlín Region
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Mgr. Jan Kalenda, Ph.D.
Implementation period: 2014 – 2015

Total project cost (CZK thous.):	17 588
Total project cost – TBU (CZK thous.):	17 588
Project cost of TBU in 2015 (CZK thous.):	8 453

Educational Policy Fund

From Beginner to Mentor (supporting strategies of teacher education in the Zlín Region) Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. PaeDr. Adriana Wiegerová, PhD.
Implementation period: 2014 – 2016

Total project cost (CZK thous.):	9 556
Total project cost – TBU (CZK thous.):	9 556
Project cost of TBU in 2015 (CZK thous.):	4 429

4.3.5 Faculty of Logistics and Crisis Management

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

7AMB14SK044 Effectiveness assessment of aplication of continuous ecological transport systems of raw materials in industrial enterprises
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Ing. Jan Strohmandl
Implementation period: 2014 – 2015

Total project cost (CZK thous.):	98
Total project cost – TBU (CZK thous.):	98
Project cost of TBU in 2015 (CZK thous.):	49

Operational program Education for Competitiveness (OP VK)

CZ.1.07/2.2.00/28.0185 Innovation and Development of Education in Security with the Focus of Crisis Management
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: prof. Ing. Dušan Vičar, CSc.
Implementation period: 2012 – 2015

Total project cost (CZK thous.):	11 750
Total project cost – TBU (CZK thous.):	11 750
Project cost of TBU in 2015 (CZK thous.):	506

Projects where TBU acts as a co-investigator

Operational program Education for Competitiveness (OP VK)

CZ.1.07/1.1.00/53.0009 Safely and Healthy into Life - Development of Competences in Primary and Secondary Education
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. PhDr. Ferdinand Mazal, CSc.
Implementation period: 2014 – 2015

Total project cost (CZK thous.):	17 925
Total project cost – TBU (CZK thous.):	502
Project cost of TBU in 2015 (CZK thous.):	37

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: doc. Dr. Ing. Vladimír Pavlínek
Implementation period: 2015 - 2020

Total project cost (CZK thous.):	325 648
Total project cost – TBU (CZK thous.):	325 648
Project cost of TBU in 2015 (CZK thous.):	31 048

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

7AMB14SK026 (Bio)polymers and Bio-inspired Materials for Biomedicine
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Nabanita Saha, M.Sc., Ph.D.
Implementation period: 2014 - 2015

Total project cost (CZK thous.):	100
Total project cost – TBU (CZK thous.):	100
Project cost of TBU in 2015 (CZK thous.):	50

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

EUPRO II Programme

LE12002 The Support Center for International Cooperation in Research and Development in Technical Fields
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. Vladimír Sedlařík, Ph.D.
Implementation period: 2012 - 2015
Total project cost (CZK thous.): 4 000
Total project cost – TBU (CZK thous.): 4 000
Project cost of TBU in 2015 (CZK thous.): 1 000

KONTAKT II Programme

LH14050 Synthesis of Polypeptoid Nanosheets for Biomineralization
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Nabanita Saha, M.Sc., Ph.D.
Implementation period: 2014 - 2016
Total project cost (CZK thous.): 1 348
Total project cost – TBU (CZK thous.): 1 348
Project cost of TBU in 2015 (CZK thous.): 467

LH14273 Construction and electrochemical properties of supercapacitors for high efficiency energy storage systems
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: prof. Ing. Petr Sáha, CSc.
Implementation period: 2014 - 2016
Total project cost (CZK thous.): 1 797
Total project cost – TBU (CZK thous.): 1 797
Project cost of TBU in 2015 (CZK thous.): 659

Operational Programme Research and Development for Innovation (OP VVI)

CZ.1.05/2.1.00/19.0409 CPS - Strengthening Research Capacity
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Dr. Ing. Vladimír Pavlínek
Implementation period: 2015
Total project cost (CZK thous.): 48 815
Total project cost – TBU (CZK thous.): 48 815
Project cost of TBU in 2014 (CZK thous.): 48 815

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

In 2015, 1 project financed by the Ministry of the Interior of the Czech Republic was implemented at the TBU in Zlín. Total eligible costs amounted CZK 682 thousand for TBU in Zlín in 2015.

4.4.1 Faculty of Applied Informatics

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.):	12 520
Total project cost – TBU (CZK thous.):	12 520
Project cost of TBU in 2015 (CZK thous.):	682

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

In 2015, 2 projects financed by the Ministry of Agriculture of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 1,918 thousand for TBU in Zlín in 2015.

4.5.1 Faculty of Technology

Projects where TBU acts as a co-investigator

KUS - Comprehensive Sustainable Systems in Agriculture

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

Total project cost (CZK thous.):	20 093
Total project cost – TBU (CZK thous.):	2 984
Project cost of TBU in 2015 (CZK thous.):	575

4.5.2 University Institute

KUS - Comprehensive Sustainable Systems in Agriculture

QJ1310254 Research into the use of whey as dairy industry waste product, the production of antimicrobial compounds for the modification of hydrophilic polymer systems
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. Vladimír Sedlařík, Ph.D.
Implementation period: 2013 - 2017

Total project cost (CZK thous.):	16 401
Total project cost – TBU (CZK thous.):	7 339
Project cost of TBU in 2015 (CZK thous.):	1 343

4.6 Projects financed by the Ministry of Regional Development of the Czech Republic

In 2015, 1 project financed by the Ministry of Regional Development of the Czech Republic was implemented at the TBU in Zlín. Total eligible costs amounted CZK 639 thousand for TBU in Zlín in 2015.

Operational Programme Operational Programme Cross-border Cooperation

Non Profit Organisations in Civil Society
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: PaedDr. Marcela Göttlichová
Implementation period: 2015

Total project cost (CZK thous.):	639
Total project cost – TBU (CZK thous.):	639
Project cost of TBU in 2015 (CZK thous.):	639

4.7 Projects financed by the Technology Agency of the Czech Republic

In 2015, 8 projects financed by the Technology Agency of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 15,349 thousand for TBU in Zlín in 2015.

4.7.1 Faculty of Technology

Projects where TBU acts as a co-investigator

ALFA Programme

TA03010724 AV and EV LED luminaire with a higher degree of protection
Principal investigator: TREVOS, a. s.

Project investigator on behalf of TBU: Ing. Štěpán Šanda, Ph.D.
Implementation period: 2013 - 2015
Total project cost (CZK thous.): 14 655
Total project cost – TBU (CZK thous.): 2 000
Project cost of TBU in 2015 (CZK thous.): 700

TA03010799 Use of nanostructures and natural extracts as functional substances in active packaging materials with barrier, antimicrobial, protective and oxygen absorbing effects
Principal investigator: INVOS, spol. s r. o.
Project investigator on behalf of TBU: Ing. Dagmar Měřínská
Implementation period: 2013 - 2015
Total project cost (CZK thous.): 6 125
Total project cost – TBU (CZK thous.): 2 180
Project cost of TBU in 2015 (CZK thous.): 770

TA04020258 Advanced technology of lithotrophic immobilization and anaerobic bioremediation for the remediation and prevention of environmental damage
Principal investigator: EPS, s. r. o.
Project investigator on behalf of TBU: doc. Mgr. Marek Koutný, Ph.D.
Implementation period: 2014 - 2017
Total project cost (CZK thous.): 18 261
Total project cost – TBU (CZK thous.): 2 939
Project cost of TBU in 2015 (CZK thous.): 919

EPSILON Programme

TH01030054 The possibility of PES waste shredded material and next technological waste processing
Principal investigator: Fatra, a. s.
Project investigator on behalf of TBU: doc. Ing. Dagmar Měřínská, Ph.D.
Implementation period: 2015 - 2017
Total project cost (CZK thous.): 10 070
Total project cost – TBU (CZK thous.): 2 403
Project cost of TBU in 2015 (CZK thous.): 786

4.7.2 Faculty of Management and Economics

OMEGA Programme

TD020291 Research into the development of professional orientation of students of secondary schools with regard to the parameterization of their further studies and job market
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. Zuzana Dohnalová, Ph.D.
Implementation period: 2014 - 2015
Total project cost (CZK thous.): 1 550
Total project cost – TBU (CZK thous.): 1 550
Project cost of TBU in 2015 (CZK thous.): 775

4.7.3 University Institute

Programme Competence Centre

TE01020216 Centre of advanced polymer and composite materials
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: doc. Ing. Tomáš Sedláček, Ph. D.
Implementation period: 2012 - 2019

Total project cost (CZK thous.):	209 644
Total project cost – TBU (CZK thous.):	69 077
Project cost of TBU in 2015 (CZK thous.):	8 949

Projects where TBU acts as a co-investigator

TE02000006 Centre for alternative environment friendly high effective polymer antimicrobial agents for industrial applications
Principal investigator: SYNPO, akciová společnost
Project investigator on behalf of TBU: doc. Ing. Vladimír Sedlařík, Ph.D.
Implementation period: 2014 - 2019

Total project cost (CZK thous.):	126 650
Total project cost – TBU (CZK thous.):	11 300
Project cost of TBU in 2015 (CZK thous.):	2 000

EPSILON Programme

TH01011438 Development of polyurethane matrices for composite production
Principal investigator: 5M s. r. o.
Project investigator on behalf of TBU: doc. Ing. Michal Sedlačík, Ph.D.
Implementation period: 2015-2017

Total project cost (CZK thous.):	11 250
Total project cost – TBU (CZK thous.):	1 350
Project cost of TBU in 2015 (CZK thous.):	450

4.8 PROJECTS - SUMMARY

Number of projects implemented in 2015

Component part / Provider	Czech Science Foundation	Ministry of Industry and trade of the Czech Republic	Ministry of Education, Youth and Sports of the Czech Republic		Ministry of the Interior of the Czech Republic	Ministry of Agriculture of the Czech Republic	Ministry of Regional Development of the Czech Republic	Technology Agency of the Czech Republic	Total
			MEYS total	Operational Programme projects					
Faculty of Technology *	0,5	1	2	1	0	1	0	4	8,5
Faculty of Management and Economics	2	1	3	3	0	0	0	1	7
Faculty of Multimedia Communications	0	0	0	0	0	0	1	0	1
Faculty of Applied Informatics	1	0	3	2	1	0	0	0	5
Faculty of Humanities	1	0	2	1	0	0	0	0	3
Faculty of Logistics and Crisis Management	0	0	3	2	0	0	0	0	3
TBU Library	0	0	0	0	0	0	0	0	0
University Institute	2,5	0	7	1	0	1	0	3	13,5
Rectorate	0	0	0	0	0	0	0	0	0
TBU total	7	2	20	10	1	2	1	8	41

Explanatory: * from which 1 project was solved in cooperation FT with CPS

Total costs acknowledged for TBU in Zlín in 2015 (in CZK thousands)

Component part / Provider	Czech Science Foundation	Ministry of Industry and trade of the Czech Republic	Ministry of Education, Youth and Sports of the Czech Republic		Ministry of the Interior of the Czech Republic	Ministry of Agriculture of the Czech Republic	Ministry of Regional Development of the Czech Republic	Technology Agency of the Czech Republic	Total
			MEYS total	Operational Programme projects					
Faculty of Technology *	125	295	741	424	0	575	0	3175	4 911
Faculty of Management and Economics	424	975	8 993	8 993	0	0	0	775	11 167
Faculty of Multimedia Communications	0	0	0	0	0	0	639	0	639
Faculty of Applied Informatics	480	0	83 272	54 508	682	0	0	0	84 434
Faculty of Humanities	754	0	12 882	8 453	0	0	0	0	13 636
Faculty of Logistics and Crisis Management	0	0	592	543	0	0	0	0	592
TBU Library	0	0	0	0	0	0	0	0	0
University Institute	4511	0	82 115	48 815	0	1 343	0	11399	99 368
Rectorate	0	0	0	0	0	0	0	0	0
TBU total	6 294	1 270	188 595	121 736	682	1 918	639	15 349	214 747

Science Activity Annual Report

2015

The publication was not checked for language or editorial