

DISCLOSING SUGAR POLYMERIZATION DETERMINANTS OF THE LEVANSUCRASE PROTEIN OF *Pseudomonas syringae* pv. TOMATO USING STRUCTURE-FUNCTION ANALYSIS
Invited lecture

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Levansucrases are bacterial exoenzymes that produce from sucrose fructan polymers of different chain length. The functions of levansucrases for the host bacteria are not clear yet. A plant pathogen *Pseudomonas syringae* pv. tomato has three levansucrase genes: *lsc1*, *lsc2* and *lsc3*. We will characterize respective proteins and address structure-function relationships of the Lsc3 protein focusing on polymerization determinants.

The authors thank Estonian Science Foundation (grants 7528 and 9072) for the support.

IDENTIFICATION OF HYDROCOLLOIDS IN CONFECTIONERY JELLY

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Infrared spectroscopy offers many important advantages in the analysis of confectionary products. On the basis of infrared spectra in MIR or NIR region, the formulation of confectionary jelly can be easily proved and thus confirming the presence of gelatine or polysaccharides. The evaluation of the first or second derivatization of spectra by multivariable statistics allowed the separation of samples into groups according to their composition.

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BEE POLLENS AS FOOD SUPPLEMENT: COMPOSITION AND SOURCE SPECIFICITY

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Bee and honeycomb pollen is source of biologically active and nutritive compounds and thus has been used for the preparation of food supplements. Hydrophobic (fats, fatty acids, carotenes etc.) and hydrophilic (carbohydrates, polyphenols) fractions were isolated from pollen materials of various origin by subsequent extractions with hexane and ethanol. GC analysis confirmed that fatty acid distribution in pollen depends on botanical origin, processing and storage. Insoluble biopolymers (proteins, polysaccharides) were resistant to pepsin treatment in acidic conditions, but some decrease of the contribution of polysaccharides was detected due to their extraction to the medium. Bee pollen granules demonstrated evident variability in morphology and colour depending on the botanical origin. Differently coloured granules or pollen grains on their surface may be explained by some heterogeneity in botanical composition. Microscopy demonstrated significant differences in morphology of pollen grains of different botanical origin, and thus confirmed to be rapid and effective screening method for pollen identification.

This work was supported by the Ministry of Education, Youth and Sport of the Czech Republic (projects No CEZ: MSM6046137305).

THE INFLUENCE OF DISSOLVING CONDITIONS OF POLYSACCHARIDES ISOLATED FROM CEREALS ON THEIR MOLECULAR CHARACTERISTICS

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Dissolving of the polysaccharides such as starch, beta-glucan, water soluble and water insoluble arabinoxylans prior to molecular properties determination is crucial to obtain valuable information. Therefore the aim of the study was to check the influence of dissolving conditions of chosen polysaccharides on their molecular characteristics determined by HPSEC/RI.

COMPARISON OF PHYSICO-CHEMICAL AND MOLECULAR PROPERTIES OF WATER SOLUBLE AND WATER INSOLUBLE ARABINOXYLANS FROM RYE GRAIN

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Arabinoxylans are apart from starch main component of rye bread which are responsible for its properties. The aim of the study was to examine physico-chemical properties of water soluble and water insoluble rye arabinoxylans. The properties were related to determined molecular parameters of arabinoxylans such as arabinose to xylose ratio, molecular mass, dispersity and degree of substitution of xylan chain.

This study was supported by Ministry of Science and Informatization grant Iuventus Plus - IP2011 005571.

ANTICOAGULANT ACTIVITY OF THE POLYSACCHARIDE-POLYPHENOLIC CONJUGATE FROM *S. officinalis* L.

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From the flowering parts of Great burnet (*Sanguisorba officinalis* L.) a water-soluble polysaccharide-polyphenolic conjugate has been isolated by alkaline extraction. Chemical analysis revealed the presence of pectic type of polysaccharides in the glycoconjugate. In *in vitro* anticoagulant activity tests the glycoconjugate showed inhibition of plasma clot formation, however, its effect was lower as that of unfractionated heparine.

Study was supported by the Grants WROVASC, Poland, VEGA 2/0017/11, APVV 0125/11 and by the project ITMS 26240120031, supported by the R&DOP funded by the ERDF.

ISOLATION OF POLYSACCHARIDE MOIETY FROM *Vibrio cholerae* O139 LIPOPOLYSACCHARIDE – OPTIMIZED METHOD

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Polysaccharide moiety (O-SP+C) of the Gram-negative bacteria lipopolysaccharide (LPS) is responsible for immunogenicity and production of vibriocidal antibodies in the host. Therefore it plays an important role in designing of conjugated and non-conjugated cholera vaccines¹. This work presents an optimized method of hot phenol/water extraction² of *V. cholerae* O139 LPS and its detoxification by means of mild acid hydrolysis. Prepared O-SP+C was characterized by means of NMR (¹H, ³¹P and HSQC), FTIR ATR and UV spectroscopy. SDS-PAGE excluded the presence of toxic LPS.

The authors would like to acknowledge the Health Sciences North for financial support.

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THERMOPLASTIC STARCH / CLAY COMPOSITES BASED ON VARIOUS KINDS OF STARCHES

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Thermoplastic starch is a promising material for a packaging industry, combining availability, low price and complete biodegradability. However, the main weakness of this material is low tensile strength in comparison with conventional polymeric packaging materials, like polyolefines. The task is to find an optimal combination of starch type and a reinforcing compound.

Authors wish to thank the Ministry of Industry (grant MPO TIP FR-T11/566) and the Ministry of Education (grant SGS-2010-021) for financial support.

HYDROPHOBIZATION OF STARCH-BASED BIODEGRADABLE MATERIALS**PETR DUCHEK***, **JAROMÍR DLOUHÝ**, and **PETR FRANČE***University of West Bohemia, Univerzitní 20, 306 14 Plzeň, Czech Republic
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Biodegradable matrices based on potato starch and corresponding composites with low amount of clays were hydrophobized by means of commercially available materials. The aim of this study was to lower hydrophobic behaviour of biodegradable materials that influences its properties negatively. Stability of matrices/composites in the aqueous environment and mechanical properties were determined.

The authors wish to thank the Ministry of Industry and Trade of the Czech Republic (project TIP No. FR - TII/566) and the University of West Bohemia (project SGS-2010-021) for financial support.

INFLUENCE OF POLYSACCHARIDES ON PHYSICOCHEMICAL CHARACTERISTICS OF WHEY PROTEIN CONCENTRATE SOLUTIONS WITH CREATINE ADDITION**AGNIESZKA DYLEWSKA****University of Life Sciences, Department of Milk and Hydrocolloides Technology, Skromna 8, 20-704 Lublin, Poland
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Whey protein concentrate is highly consumed by physically active people. Together with creatine in the aqueous solution it can compose a useful diet supplement. Polysaccharides can slow down the sedimentation process of creatine in water and improve the quality of the product. After the addition of a polysaccharide, the time at which the visible precipitate appeared was measured. The surface tension and viscosity measurements were also assessed.

WOOD-DECAY FUNGI β -GLUCANS – FUNCTIONS AND PROPERTIES**GORDON K. GOMBA**, **ANDRIY SYNYTSYA**, and **JANA ČOPIKOVÁ***Institute of Chemical Technology, Prague, Technická 3, 166 28 Praha 6, Czech Republic
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Wood-decay fungi can be grouped into soft-rot, brown-rot and white-rot fungi. They form a very integral part of the forest ecosystem. They disintegrate wood and humus into simple organic compounds, degrade soil pollutants and adsorb and accumulate heavy metals exceptionally well. Their β -glucan polysaccharides, acting alone or in combination with proteins and phenolic compounds, invoke immunomodulatory and anticancer activities which are known for the treatment of tuberculosis, gastritis and cancers in folk asia, among other notable diseases such as heart, liver and stomach ailments or cardiovascular diseases and diabetes.

This work was supported by the Ministry of Education, Youth and Sport of the Czech Republic (ICT Prague Project No 321 88 1220).

PREPARATION AND CHARACTERIZATION OF POROUS ALUMINA CERAMICS BY UNIAXIAL PRESSING WITH SACCHARIDES AND POLYSACCHARIDES**EVA GREGOROVÁ***, **WILLI PABST**, and **HANA REZKOVÁ***Department of Glass and Ceramics, Institute of Chemical Technology, Prague (ICT Prague), Technická 5, 166 28 Prague 6, Czech Republic
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Different saccharides (glucose, sucrose) and polysaccharides (inulin, rice starch) are compared with respect to their performance in uniaxial pressing of submicron alumina powder. The pore formers are characterized by image analysis, the mechanical strength of the as-pressed composite discs via diametral compression (Brazilian tests) and the as-fired porous ceramics via the Archimedes method (porosity) and microscopy (pores and pore space).

This work is part of the project “Porous ceramics with tailored elasticity and thermal conductivity” (GAČR No. P108/12/1170) and the project 7AMB12AR015 (MOBILITY).

THE BEHAVIOUR OF (1-3)(1-4)- β -D-GLUCAN IN A SEED COMPLEX DURING THERMAL STRESS

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In the presented work, seeds with different amounts of β -D-glucan were exposed to temperatures of -20 , 0 , 30 , and 70 °C for 30 days to simulate seed storage and processing. Compared to control, thermal stress influenced the behavior of β -D-glucan as well as other starch and non-starch polysaccharides. The highest amounts of β -D-glucan were observed by -20 °C and strong correlations were monitored between qualitative parameters. Seed with higher amounts of β -D-glucan were more plastic and better reacted to the thermal stress. Results interpretation is deeper discussed in the presentation.

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THE SIGNIFICANCE OF (1-3)(1-4)- β -D-GLUCAN IN THE PLANT: REALITY VERSUS CHALLENGES

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In the plant, (1-3)(1-4)- β -D-glucan is localized in the cell walls where environmental stresses can occur and the ability to resist is influenced by nature of the cell wall and its structure. Its role is in the architecture and plant development as a source of energy as well as water regulator. Physical and chemical properties of β -D-glucan are commercially, nutritionally, and pharmaceutically worldwide accepted and well documented; it is used as functional ingredient in food, cosmetic, and pharmaceutical industries and as food additives on the basis of fibers.

Financial support: Project “BIFUGEN” of the Ministry of Agriculture and Rural Development of the Slovak Republic.

ISOLATION OF GALACTOOLIGOSACCHARIDES FROM WHEY AFTER TREATMENT BY BETA-GALACTOSIDASE

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Galactooligosaccharides (GOS) were prepared by transgalactosylation from lactose (200 g L^{-1}) in recombinant whey permeate which was demineralized by electro-dialysis. Reaction mixture used for isolation contained 82.4 g L^{-1} of GOS after enzyme treatment by Maxilact A4. Isolation of GOS from lactose, glucose and galactose by both discontinuous and SMB chromatography was tested using columns containing Lewatit 1368 MDS in Ca and Na form.

FLOW FIELD-FLOW FRACTIONATION VERSUS GEL PERMEATION CHROMATOGRAPHY OF SODIUM HYALURONATE

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Sodium hyaluronate (HA) with various molar mass ranging from 10^4 up to 10^6 was characterized using flow field-flow fractionation (FIFFF) coupled online to multi-angle light scattering and refractive index detector to determine the size, molar mass distribution and conformation of HA. FIFFF data are compared to results measured by gel-permeation chromatography (GPC). The advantages and limitations of both methods (FIFFF and GPC) are discussed.

STRUCTURAL FEATURES AND ANTIOXIDANT ACTIVITY OF WATER-EXTRACTABLE POLYSACCHARIDES FROM SPELT BRAN

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A water extractable polysaccharide from spelt bran and its sub-fractions were isolated and purified by ethanol precipitation, enzymatic digestion and dialysis. Xylans were found to be the predominant hemicellulosic polysaccharide in all fractions. Structural characteristics of crude and purified fractions were investigated by a combination of chemical and instrumental analysis (FTIR, NMR). The polysaccharides displayed significant radical scavenging activities.

The Slovak Grant Agency VEGA, grant No. 2/0062/09 and COST FP0901 financially supported this work.

COMPOSITE FLOUR – STARCH AND BREAD CHARACTERISTICS

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Influence of two non-traditional cereals (hemp, teff – addition 5–20 %) on changes of the wheat flour gelatinization behavior was evaluated. The impacts of these components on bread characteristics were described according to standard methods for starch behavior testing (Falling Number, amylograph test). The internal methods were used for bread evaluation (the baking test). Correlation analysis confirmed significant relationships between starch quality and baking characteristics of evaluated composites.

This research was supported by the project QI 1111 B053 (Ministry of Agriculture).

MUSHROOM POLYSACCHARIDES – CURRENT AND FUTURE PROSPECTS

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Although medicinal mushrooms have been consumed for many centuries in Asia, the first mushroom glucan – Lentinan from *Lentinula edodes* – was isolated in 1950s. The isolation of other glucans (Schizophyllan, Krestin) in Japan followed. Medicinal mushrooms are used mainly for production of food supplements in the form of powdered fruiting body in capsules and tablets, liquid state fermentation, solid state fermentation biomass and mixture of isolated glucans. Their future usage in Europe will depend on food supplements EU legislation.

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INVESTIGATION OF CHEMICAL COMPOSITION AND RHEOLOGICAL PROPERTIES OF BARLEY GENOTYPES

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Selected genotypes of hulless spring barley (cv. "AF Lucius", lines "KM 2084", "KM 2283" and "KM 1057" with light colored grain and genetic resource "Nudimelanocrithon" with dark colored grain) and winter wheat variety "Citrus" (with yellow endosperm), perspective for food utilization due its exceptionally high nutritive value, were investigated for chemical composition (crude protein, starch, β -glucans, macro-minerals) and rheological properties (farinograph, extensigraph, rheometer). Results obtained from 2 localities (Kromeriz, Praha) and 2 years (2010, 2011) showed great differences between barley materials, which differed more in physical characteristics (viscosity) than in chemical composition. In all barley samples studied the values of extensigraph parameters were low (especially for energy and extensibility), viscosity higher and the standard farinograph parameters varied in comparison with wheat variety "Citrus". Significant

differences in rheological properties from individual sites, probably caused by different matters of non starch polysaccharides accumulation, should be taken into account before use of barley materials in food products development.

This work was financially supported by the Ministry of Agriculture of the Czech Republic (QI91B095, QJ1210257, RO0211).

DIFFERENT TAGGING MODES OF A LEVANSUCRASE PROTEIN FROM *Pseudomonas syringae* PV. TOMATO FOR STRUCTURE-FUNCTION ANALYSIS

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High amount of catalytically active pure protein is needed for its structural analysis. We will address tagging options for efficient heterologous synthesis and purification of levansucrase (Lsc3) protein of *P. syringae* pv. tomato. Two variants of *N*-terminal removable His-tags and a *C*-terminal His-tag will be used. The proteins will be purified using Ni²⁺-affinity chromatography and biochemically characterized.

The authors thank Estonian Science Foundation (grants 7528 and 9072 to T.A.) and Archimedes Foundation (grant to K.M.) for financial support.

ACCUMULATION OF β -(1,3)-D-GLUCAN IN ROOTS EXPOSED TO HEAVY METALS

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The aim of this work was to evaluate the effect of selected heavy metals on β -(1,3)-D-glucan (callose) accumulation in roots of maize and soybean. A significant increase in the callose content was detected in both maize and soybean roots exposed to Pb²⁺ and Cd²⁺ ions, but not in those exposed to As³⁺ ions. Microscopic observations confirmed new callose deposits in roots depending on the plant species as well as the metal type applied.

This work was supported by the Slovak Grant Agency VEGA, grants No. 2/0062/11 and 1/0509/12.

SPRAY DRYING THERMOPLASTIC STARCH FORMULATIONS: NEED FOR PROCESSING AIDS AND PLASTICIZERS?

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The role of malto-oligosaccharide molecular weight in the potential cross-over from acting as a processing aid to performing as a starch plasticizer was investigated. The results show that the interaction of starch with oligosaccharides is correlated with molecular weight of the latter, i.e. the dextrose equivalent (DE). This interaction has a positive effect on the rate of retrogradation and the rate of moisture uptake. Nevertheless, the additives tested act as processing aids and not as plasticizers and therefore contribute to the optimization of the spray-drying operation.

Bilal Niazi was supported by the Higher Education Commission (HEC) Program of the Government of Pakistan.

OXIDIZED POTATO STARCH BASED THERMOPLASTIC FILMS: EFFECT OF COMBINATION OF POLAR AND AMPHIPHILIC PLASTICIZERS

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The role of different combinations of polar (glycerol and water) and amphiphilic (isoleucine) plasticizers in the production of oxidized potato starch TPS films were investigated. The addition of amphiphilic plasticizer with glycerol results in: (i) improved flowability, and processability of powder, (ii) improved powder yield during spray drying, (iii) decreased elongation and rate of moisture uptake, (iv) increased crystallinity, and (v) increased stiffness, strength and rigidity of the TPS materials. Nevertheless, the effect depends on the nature and combination used of amphiphilic plasticizer with glycerol.

Bilal Niazi was supported by the Higher Education Commission (HEC) Program of the Government of Pakistan.

NEW CONCEPTS OF WOUND DRESSINGS**MIROSLAV NOVÁK and JANA ČOPÍKOVÁ**

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Modern concepts of dressings applied to open wounds should not only cover them but also prevent microbial infections and speed up healing. Besides these principal properties such dressings have to meet certain other conditions, e.g., they must be easily removable, enable gas transfer, absorb exudates, release certain drugs, etc., and, last not least, have proper mechanical strength. Over the time many types of such dressings have been designed; in most of them polysaccharides, such as β -glucan and/or chitin/chitosan, play important role and are extensively studied.

The work was supported by the Ministry of Education, Youth and Sports (project No. 6046137305) and the Czech Science Foundation (project No. 503/11/2479).

COAM: AN AMYLOSE-DERIVATIVE WITH ANTIVIRAL AND APPLICABLE IMMUNOLOGICAL ACTIVITIES*Invited lecture***SANDRA LI, NELE BERGHMANS, HELENE PICCARD, JO VAN DAMME, and GHISLAIN OPDENAKKER**

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Chlorite-oxidized oxyamylose (COAM) is a chemical derivative of the polysaccharide amylose. It was originally synthesized as a biodegradable polyanionic antiviral agent. Only recently the mechanism of action of COAM was found to be based on interactions with the chemokine system. In view of the observations that COAM induces chemokine expression *in vitro* and *in vivo* in the mouse and human species and that it selectively binds chemokines, we studied possible applications of this polysaccharide-derivative in tumor and inflammation biology. Local intradermal injection of COAM in a syngeneic mouse B16 melanoma model in C57/BL6 mice reduced early melanoma growth, coincident with induction of granulocyte chemotactic protein-2 (GCP-2/CXCL6) and intratumoral neutrophil influx. However, COAM had no systemic antitumoral effects. Because neutrophil influx is also an important sign of hyperacute neuroinflammation in animal models of viral and experimental autoimmune encephalomyelitis (EAE), we studied the systemic effect of intraperi-

toneally injected COAM against hyperacute spinal cord homogenate-induced EAE and its neuropathological signs. COAM reduced significantly the expression levels of the neutrophil CXC chemokines (KC/CXCL1 and MIP-2/CXCL2) and diminished the numbers of leukocytes in the central nervous system of mice with EAE. The effects of COAM on the numbers of circulating blood and splenic leukocytes were limited, but significant alterations were observed at the intraperitoneal COAM injection site. The use of polysaccharide-derivatives with immunomodulating activities may thus complement existing treatment options for neuroinflammatory diseases.

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THE USE OF STARCH FOR THE PREPARATION OF POROUS CORDIERITE CERAMICS BY SLIP CASTING PROCESSES**WILLI PABST^{a*}, EVA GREGOROVÁ^a, LAURA MARÍA SANDOVAL^b, and ANDREA MARÍA CAMERUCCI^a**

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Cordierite ceramics are widely used technical ceramics for applications ranging from kiln furniture to catalyst supports and diesel particulate filters. Starch can be used as a pore former to introduce porosity. In this contribution we describe the preparation of porous cordierite ceramics via traditional slip casting and so-called “starch consolidation casting” using native potato starch and compare raw materials particle size, rheology and microstructures.

This work is part of the project “Porous silicate ceramics with starch and starch-based products – from optimized preparation to advanced characterization” (7AMB12AR015).

THE PROPERTIES OF POLYSACCHARIDE SOLUTIONS OBTAINED FROM AQUATIC ORGANISMS OF THE BARENTS SEA

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The relations between optical activity of chitosan, alginic acid, chondroitin sulfate solutions and the nature of the hydrolyzing agent, time of hydrolysis and the nature of raw materials were studied. The spectral and viscosity characteristics of solutions were studied. Polysaccharides were obtained from the red king crab, antarctic shrimp, kelp algae, northern stingray, shark, salmon, sea cucumber using known and newly developed technologies.

APPLYING OF DERIVATIVES OF POLYSACCHARIDES IN MEDICAMENTS

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Polysaccharides and their derivatives have many functions in medicaments. The application of infrared spectroscopy in identification of polysaccharides in such multicomponent systems seems to be promising. On the basis of infrared spectra in MIR region, the confirmation of the declared polysaccharides' presence in a set of medicaments was tested. The evaluation of the spectra by multivariable statistics allowed the separation of samples into groups according to their chemical composition.

This work was supported by the Ministry of Education, Youth and Sport of the Czech Republic (projects No CEZ: MSM6046137305).

STATE-OF-THE-ART N- AND O-GLYCOANALYTICS FOR THE PHARMACEUTICAL INDUSTRY

Invited lecture

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Glycan structures are, in the first instance, controlled by genes, however the complex pathways and epigenetic factors that regulate their processing provide a further mechanism for fine tuning and diversifying the glycans and the functions of the proteins to which they are attached. Thus in the manufacturing of glycosylated therapeutics, such as MABs and ESAs, it is imperative to understand the roles for glycosylation in maintaining drug safety and efficacy and to ensure regular and appropriate monitoring of the process and product. A strategy for multidimensional N-glycan analysis will be presented that can help to assess what level of analysis might be needed. This includes a description of a robotic platform capable of releasing and labelling N-glycans from glycoproteins in a 96 well plate format that has been developed as a front end to various glycan separations technologies including HILC and RP HPLC, MS Capillary Electrophoresis, chip technologies and combinations of these techniques. Data bases (Glycibase 3) for many of these technologies are available at (<http://glycibase.nibr.ie/tools.html>) and are continually being extended. The next frontier is to improve technologies for O-glycan analysis and this will be an important focus of the presentation.

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HYALURONIC ACID FROM SOME AQUATIC COMMERCIAL SPECIES OF THE BARENTS SEA

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Possibility of obtaining of hyaluronic acid (HA) from fish processing waste was showed in our research. The goal was obtaining and quantitative identification of polysaccharides, contained in this waste. It was established that some method of determining uronic acids and monomeric components have some limitations and not suitable for identification HA. The possibility of using the method of IR spectroscopy for identification hyaluronic acid was demonstrated.

THE EFFECT OF SALT CONCENTRATION AND pH VALUE ON THE REOLOGICAL PROPERTIES OF MULTICOMPONENT MIXTURES OF WHEY PROTEINS WITH POLYSACCHARIDES

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Protein-polysaccharide complexes have many applications in biotechnology, medicine, pharmacy, food industry and in other technologies. The aim of this study was to investigate the effect of addition of kappa carrageenan and others polysaccharides on the rheological properties of whey protein gels. The influence of the pH, types of salts and their concentrations on the gel formation process of the polysaccharide-protein systems were also determined.

DISTRIBUTION AND PHYSICOCHEMICAL PROPERTIES OF POLYSACCHARIDES IN DIFFERENT BARLEY MILLING STREAMS

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The aim of this work was to determine the distribution and physicochemical properties (retention capacities) of polysaccharides in single milling streams from hull and hull-less Czech barley varieties. The contents of β -glucans, arabinoxylans, fructans, total dietary fibre, total starch and damaged starch were compared in individual flour and meal barley streams. The results of chemical analysis were in accordance with those of FT-IR study.

This work was supported by project New Food No QI111B053.

CHITIN-GLUCAN COMPLEX FROM *Schizophyllum commune* SUBMERGED MYCELIUM AS A NEW MATERIAL FOR WOUND HEALING

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Microstructure and chemical composition of chitin-glucan complex (CGC) from *Schizophyllum commune* submerged mycelium were characterized, and CGC wound healing properties were studied. The results suggest that administration of CGC significantly improved wound-healing activity. CGC may be helpful in wound repair on excisional wound healing process in normal skin or in ischemic tissue.

STARCH DETERMINATION IN NON-TRADITIONAL MATERIALS USING EWERS POLARIMETRIC METHOD

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Ewers method is commonly applied for starch determination in cereals and tubers. It has the advantages in comparison with enzyme method being inexpensive, rapid and applicable in industrial laboratories. Ewers polarimetric method is used as the official EEC method for the measurement of starch purity as well. The method is based on specific rotation of polarized light of the starch dissolved in acid solution. Megazyme assay procedure for determination of total starch was utilized to evaluate specific rotation constant of pea starch and of starch contained in microalgae *Chlorella vulgaris* as new energy source.

This work was supported by the Ministry of Education, Youth and Sports of the Czech Republic through the project EUREKA (OE09025-ALGANOL).

STARCH RETROGRADATION AS A FACTOR OF TEXTURE DETERIORATION DURING MAP STORAGE OF BREAD

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The objective of this work was to find the relationships between the chemical indices of starch retrogradation and instrumental and sensory measures of wholemeal bread stored at modified atmosphere (70 % CO₂, 30 % N₂). During 32 consecutive days of bread storage at room temperature the greatest changes in crust crispiness and shearing work and crumb hardness and elasticity were observed. They correlated well with the blue value which informs about starch retrogradation.

COMPLEXES OF MODIFIED POTATO STARCH WITH GLYCININ

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Complexes of oxidized potato starch with soy glycinin were prepared by electrosynthesis method. Infrared spectra and solubility trials in various solvents shows that the phosphate moieties of starch and peptide bonds of glycinin with hydrophobic interactions are engaged in complex formation. Electrocomplexes are insoluble in water, poorly hydrolysable by amylases but well by proteolytic enzymes. They are also biodegradable by bacteria from soil.

ANNEALING OF POTATO STARCH GRANULES AFTER WET ULTRAFINE GRINDING

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Annealing is usually defined as a process which involves incubation of starch granules at a temperature above the glass transition but below the onset of gelatinization; above 40% water w/w. The processed starch used for the experiments was ultrafine ground potato starch – see (cit.¹) – which was incubated at temperatures 50 °C, 25 °C and 0–4 °C and at 59 % water w/w. Different behaviour of samples was revealed using microscopy, XRD and DSC techniques.

This research was supported by the Research Intention Theoretical Fundamentals of Food and Biochemical Technologies of MSM CR, No. MSM 6046137305.

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PROPERTIES OF A NEW BIODEGRADABLE COMPOSITE BASED ON WHEAT B-STARCH

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Acetylated wheat B-starch was applied in new biodegradable films using a patented process. The prepared composites are useful particularly for packaging, for objects with short life, or as compostable mulch films for agriculture. The following properties of thermoplastic starch were tested: Young modulus and yield stress of prepared films, affinity for water, chemical and biochemical properties of compost where the formed films were stored.

Supported by the Czech Science Foundation, Grant No. 525/09/0607, and by the Ministry of Education, Youth, and Sports of the Czech Republic, Project No. MSM 6046070901.

EXTRUSION PROCESSING OF A NEW BIODEGRADABLE COMPOSITE

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The paper describes the procedure of thermoplastic starch preparation and characterization of the product. The procedure consists of three steps – 1st step: acetylation of starch, maltodextrin and of other compounds in one stirred tank, 2nd step: spray drying of the product, 3rd step: extrusion with other additives using laboratory Kompaktextruder KE 19/25 (Brabender, Germany). Extrusion process was realized at three temperature regimes.

This research was supported by the “Biodegradable composites based on B-starch for agriculture applications” research grant, GA ČR 525/09/0607.

DETERMINING MOLECULAR SIZE, AGGREGATION BEHAVIOR AND INTERACTIONS OF HYALURONIC ACID USING DIFFUSION ORDERED SPECTROSCOPY

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Diffusion-ordered spectroscopy (DOSY) experiments were successfully performed to i) achieve estimation of molecular weight of negatively charged hyaluronan, ii) detect the aggregation behavior of modified hyaluronan derivatives, and iii) exploit the conformational changes of hyaluronan in the presence of oppositely charged tenzide. The results of DOSY method are compared with SEC-MALS and literature data.

QUALITY OF COMPOSITE WHEAT/HEMP FLOUR EVALUATION

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Quality of composites prepared with different amounts (5, 10, 15 and 20 %) of hemp flour (K1, K2, K3) blended with wheat flour was characterized by analytical (protein content, Zeleny's value, Falling Number) and rheological (mixolab, farinograph, extensigraph) properties. Correlation analysis confirmed significant relationships between mixolab and rheological parameters related to protein properties (C1, C2, C1-C2 vs. farinograph and extensigraph ones).

This research was supported by the project QI 1111 B053 (Ministry of Agriculture).

AMIDATION OF OXIDIZED CELLULOSE AND CARBOXYMETHYL CELLULOSE

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Oxidized cellulose and carboxymethyl cellulose itself can undergo further chemical modifications that may lead

to obtaining of new perspective materials. The first step included preparation of methyl ester. Then obtained methyl ester was amidated using selected alkylamines, ethanolamine, ethylenediamine, hydrazine hydrochloride and hydroxylamine hydrochloride. Another approach included one-step amidation with the same agents using microwave reactor.

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SURFACE PROPERTIES OF CHEMICALLY MODIFIED XYLAN FILMS

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The main goal of this study was to determine surface free energies and their polar and disperse components of xylan films prepared from chemically modified (carboxymethylated) glucuronoxylans and arabinoxylans. Films prepared from 1 % and 2 % solutions of carboxymethylated xylan showed decrease in contact angles for about 10–30 % in comparison to nonmodified xylans. Arabinoxylans showed higher contact angles.

This study was supported by grant from the Slovenian Technology Agency.

CHONDROITIN SULPHATE IN DIETARY SUPPLEMENTS

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Chondroitin sulfate (CS), component of normal cartilage, is used as ingredient in dietary supplements intended to treat of osteoarthritis and/or to support joint health. Of concern is the documented lack of quality in many of the marketed products. We present here a capillary electrophoretic method for the determination of CS in dietary supplements. Method is based on enzymic cleavage of CS by chondroitinase. The final products of the cleavage are variously sulphated disaccharides depending on the original CS. On a set of 35 samples of marketed dietary supplements we proved that this method is suitable for the routine analysis.

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