

ADVANCES ON UNDERSTANDING OF STRUCTURES AND ENZYME DIGESTIBILITY OF RESISTANT STARCH

Invited lecture

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Resistant starch has been demonstrated to provide health benefits, e.g., preventing diabetes and improving colon health. To include resistant starch in food products, we need to know structures and properties of the resistant starch to assure the stability of the resistant starch during the cooking process. We also need reliable methods to quantify resistant-starch contents of food products. In this lecture, we will present current understandings of the structures, properties, and mechanisms of enzyme hydrolysis of resistant starch.

The authors thank USDA, AFRI and the Plant Science Institute of Iowa State University for financial support to the study.

ELECTROSPRAYING OF CARBOHYDRATE POLYMERS FOR ENCAPSULATION APPLICATIONS

Invited lecture

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This presentation reports on an innovative protective technology based on electrohydrodynamic processing for the dry stabilization and shelf-life extension of added-value bioactives using carbohydrates as encapsulation matrices. This technology does not make use of temperature or require toxic solvents and can be adjusted to modify the morphology and size of the dry capsules processed.

PHARMACEUTICAL APPLICATIONS OF STARCH AND STARCH DERIVATIVES – A MINI-REVIEW

Invited lecture

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Starches and starch derivatives are used extensively in the pharmaceutical sector. Although they are sometimes employed as energy sources (e.g. glucose and sometimes maltodextrins) more often they are used as excipients. In this context, they aid the production and functionality of a therapeutic system but are not the therapeutic agent *per se*. In all cases, the alpha-glucans provide some commercial and technical advantages although they also have many limitations.

PRODUCTION OF LEVAN AND FRUCTOOLIGOSACCHARIDES USING LEVANSUCRASE OF *Pseudomonas syringae* PV. TOMATO

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The biological effects of β -2,6-fructan, levan, and levan-type FOS (fructooligosaccharides) are poorly studied due to their restricted availability on the market. We have elaborated and optimized the production of levan and FOS from sucrose using stable and catalytically active bacterial levansucrase Lsc3. The product yield and spectrum is highly dependent on reaction conditions. Simple precipitation and treatment methods were applied to obtain the preparations.

This research was funded by the grant GLOMR9072 from Estonian Research Council and the ERF grant 3.2.0701.12–0041 (SLOMR12215T) managed by the Archimedes Foundation.

TOTAL AND SOLUBLE β -GLUCANS IN CULTIVATED MUSHROOMS *Pleurotus* SP.

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A lot of polysaccharides, especially β -glucans from mushrooms, have positive effect on human organism,

that's why analysis of polysaccharides from various types of mushrooms is very important. All samples of mushrooms *Pleurotus* sp. were lyophilized and microwave-assisted technique was applied in extraction of water soluble polysaccharides. The content of β -glucan in mushrooms or extracts was determined by the set MUSHROOM and YEAST BETA-GLUCAN ASSAY PROCEDURE K-YBGL. The monosaccharides composition of polysaccharides in mushrooms, extracts and solids was determined after acid hydrolysis by gas chromatography. Analytical data of all samples were compared with FT IR spectra.

This work was supported by the Czech Science Foundation (project No. 503/11/2479) and by the Specific University Research (project No. 20/2014).

STRUCTURE OF AN IMMUNOACTIVE POLYSACCHARIDE ISOLATED FROM KOREAN MULBERRY FRUIT (*Morus alba* L.)

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A water-soluble polysaccharide (JS-MP-1) was isolated from the water extract of Korean white mulberry fruits (*Morus alba* L.) by ethanol precipitation and then purified by DEAE-cellulose ion exchange chromatography. Obtained final polysaccharide (1600 kDa) consisted of galactose, arabinose and rhamnose as major neutral sugars. JS-MP-1 also contains galacturonic and glucuronic acids (4:1). Sugar linkage, FTIR and correlation NMR analyses confirmed that it is a rhamnogalacturonan type I (RG I), which contains the alternating sequence of 1,4- α -D-GalAp and 1,2- α -L-Rhap units in the backbone. Neutral sugar side chains of JS-MP1 were identified as (1 \rightarrow 5)- α -L-arabinan and arabinogalactan type II (AG II) having the (1 \rightarrow 6)- β -D-galactan core. The arabinan side chains are bound to the

backbone at the O-4 position of some α -L-Rhap units, while the way of linkage between RG I and AG II chains is unclear. It was demonstrated that JS-MP-1 significantly stimulates murine macrophage RAW 264.7 cells to release chemokines (RANTES and MIP-1 α) and pro-inflammatory cytokines like TNF- α and IL-6, and induce the iNOS and COX-2 gene expression, which are responsible for the production of NO and prostaglandin PGE2, respectively. These results suggest that JS-MP-1 can act as a potent immunomodulator and these observations may support the applicability of this polysaccharide or the water extracts of mulberry fruit can be used as an immunotherapeutic adjuvant or health beneficial food material.

This research was supported by a grant from the Next-Generation BioGreen 21 Program (No. PJ0071862011), Rural Development Administration, Republic of Korea, by the Gyeonggi-do Regional Research Centre (GRRC) program at the Catholic University of Korea, by the Research Fund 2012 of the Catholic University of Korea and by the financial support from specific university research (MSMT No 20/2014).

THE INFLUENCE OF ARABINOXYLAN ON LACTIC AND ACETIC ACID CONTENT IN RYE SOURDOUGH AND BREAD

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The aim of this study was to examine the influence of arabinoxylan on lactic and acetic acid formation during sourdough fermentation and baking of rye bread. The rye flour with a different share of isolated arabinoxylan of defined properties was used as a material for sourdough preparation. The content of lactic and acetic acids was determined by developed improved HPLC/UV method, which allows for easy and quick control the changes in content of these organic acids during fermentation and rye bread baking. The obtained rye breads were also examined taking into account their appearance, texture and sensory properties.

As a result of the study the influence of arabinoxylan content in rye flour on composition of organic acids in rye sourdough and properties of obtained bread were examined.

This study was supported by Special Grant BM4761 in year 2014.

THE APPLICATION OF XYLANASE/PROTEASE METHOD FOR STARCH ISOLATION FROM RYE GRAIN

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The rye grain contains starch which has different properties in comparison to wheat starch. However isolation of this polysaccharide is very difficult because rye grain contains high amounts of arabinoxylans and protein, which hamper the isolation of small starch granules due to high viscosity of rye dough. The isolation of small granule fraction of rye starch is not possible by commonly used methods, even if protease is added during isolation process. Therefore the aim of this study was to develop the method of starch isolation from rye grain, which allows obtaining all fractions of rye starch. The obtained by newly developed method rye starch was examined and its properties were compared to rye starch isolated by known methods.

As a result of this work a significant differences between starches isolated by xylanase/protease and known methods were found. The observed differences concern such important properties as granularity, molecular mass distribution, swelling and pasting characteristics of rye starch.

PHARMACODYNAMIC PROPERTIES OF PLANT GLYCOCONJUGATES

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Antitussive activity tests, performed at different doses of conjugates, showed the reduction of cough efforts in guinea pigs. Some conjugates showed the reduction in the dose-dependent manner while in some conjugates this dose dependence was not observed. The tests evaluating the influence of conjugates on airway smooth muscle reactivity revealed more significant effect of some plant conjugates in comparison with those of commercial bronchodilators used in a clinical practice.

This study was supported by the VEGA Agency, Grant No. 2/0017/11, and the APVV Agency, Grant Nos. 0125-11 and 0305-12.

PHYSICOCHEMICAL PROPERTIES OF THE POLYELECTROLYTE COMPLEX OF CHITOSAN AND CHONDROITIN SULFATE

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Conditions for the formation of a polyelectrolyte complex polysaccharides chitosan and chondroitin sulfate extracted from aquatic organisms in the Barents Sea had been determined. Stability, surface activity, rheological properties of the complex had been studied, the effective radius of the fractions had been determined. The results of thermogravimetric analysis of the complex and the probable mechanism of its formation are shown.

IDENTIFICATION OF WAXY WHEAT INTACT GRAINS USING NEAR-INFRARED REFLECTANCE SPECTROSCOPY WITH FOURIER TRANSFORMATION

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The study presents feasibility of FT-NIR spectroscopy for identification of fully waxy wheat genotypes in intact grain. The set of 145 wheat grains including genetically confirmed fully waxy wheats, 5 reference (independent) waxy wheats and collection of declared non-waxy wheat cultivars was used for calculation of the prediction model which enabled reliably to classify wheat samples into two wheat categories (fully waxy and non-waxy).

The study was financially supported by the Ministry of Agriculture: NAZV QJ1310219 and Ministry of Education Youth and Sports, Co-operation program "MOBILITY" with Austria: 7AMB14AT005.

CHARACTERIZATION OF WHEAT STARCH PROPERTIES USING RHEOLOGICAL SYSTEM MIXOLAB

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The study presents the Mixolab System as the complete analyzer for research and quality control of wheat starch. The specific mixing protocol was developed for standard native starch Soltex NP 1 and for isolated wheat starch of 'Vinjet' cultivar obtained by laboratory washing of wheat flour. The repeatability of measuring was the main criterion of the developed protocol and its value was essentially influenced by the level of starch hydration.

The study was financially supported by the Ministry of Agriculture: NAZV QJ1310219 and MZE RO0414.

SELECTED FACTORS INFLUENCING CONTENT OF STARCH IN THE GRAIN OF WINTER WHEAT

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There were field trials with breads of winter wheat of different baking quality. The wheat was grown at 6 distinguished localities under different agro-ecological conditions for three years. Investigated quality parameters of grain are following: the protein content, the content of starch, falling number, hardness of the grain determined by the Particle size index method. The significant influence on formation of quality had locality and annual course of weather. The weather demonstrably caused increased activity of α -amylase. The starch damage was manifested by low number of decrease.

EXPERIMENTAL VERIFICATION OF CATALYTIC TRIAD RESIDUES OF *Pseudomonas syringae* PV. TOMATO LEVANSUCRASE LSC2

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All three levansucrases of *P. syringae* pv. tomato (Lsc1, Lsc2 and Lsc3) produce high-molecular levan and short-chain fructooligosaccharides from sucrose. According to sequence alignment of levansucrases we predicted that Asp46, Asp203 and Glu287 constitute the catalytic triad of Lsc2. As alanine substitution mutants of these residues drastically reduced catalytic activity of Lsc2, our prediction was proven as correct.

This research was funded by the grant GLOMR9072 from Estonian Research Council and the ERF grant 3.2.0701.12–0041 (SLOMR12215T) managed by the Archimedes Foundation.

DEGRADATION OF MOLECULAR WEIGHT DURING THE OXIDATION OF HYALURONIC ACID

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The preparation of hyaluronan polyaldehyde is performed by selective oxidation using 4-Ac-TEMPO and the nitrosonium cation is regenerated by an oxidant (NaOCl) and catalytic amount of NaBr. The reaction parameters have a drastic effect on degradation of the molecular weight such as buffer (pH), molar amount of oxidant and quenching agents. After that process of modification, we have observed that the polysaccharide have not lost its biocompatibility and biodegradability.

CHANGES IN THE SUGAR COMPOSITION AND MOLECULAR MASS DISTRIBUTION OF INDUSTRIAL GRASS POLYSACCHARIDES UNDER DIFFERENT EXTRACTION CONDITIONS

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An eco-friendly methods for industrial grass polysaccharides production the alkaline-oxidative and alkaline ultrasound-assisted extractions were used. These techniques afforded lower amounts of hemicelluloses than those obtained by means of classical extraction from the holocellulose, but no substantial differences in the main structural features between the polysaccharides were found. The extraction methods affected the molecular mass distribution of the polysaccharides. RI chromatograms (HPSEC) revealed that all fractions are bimodal.

The Slovak Grant Agency VEGA, grant No. 2/0085/13 and COST TD1203 financially supported this work.

BARLEY IMPACT ON STARCH FEATURES OF FLOUR COMPOSITES

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Influence of Hemp, Chia and Teff flour from different quality of seeds in addition 5–10 % on changes of the wheat/barley composites gelatinization was evaluated. The impacts of these products were described according to standard methods for starch behavior testing (SRC, Falling Number, amylograph test). Comparing behavior of composites with 30 % and 50 % of barley flour, similar effect of non-traditional components addition was observed.

This research was supported by the project QI 111 B053 (Ministry of Agriculture).

HYPERSPECTRAL IMAGING IN IDENTIFICATION THE PLANT CELL WALL POLYSACCHARIDES

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Raman microscope is a connection of microscope and Raman spectroscopy. It allows to collect spectra at each point of a sample. In this way a map of spatial distribution of sample's components can be obtained. This instrument allows to obtain "chemical" image of tissue and compare it with microscopic image..

In this work we would like to discuss the methodology of measurement using Raman microscopy and present Raman images obtained for fruit tissue.

This work was co-funded by National Science Center Poland (NCN 2011/01/D/NZ9/02494).

PRELIMINARY STUDIES OF DIETARY FIBER FRACTIONS FROM DIFFERENT FRUITS BASED ON FT IR AND MULTIVARIATE STATISTICAL METHODS

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The primary plant cell wall polysaccharides – cellulose, hemicellulose and pectins are a part of dietary fiber. Nowadays fresh fruit have become an important part of the diet of people all over the world as the significant source of water, vitamins, natural sugars and above all – the dietary fiber.

The aim of this study was to identify chemical and spectral differences between dietary fiber fractions from different sources. Qualitative and quantitative analysis of those materials were performed.

This work was co-funded by National Science Center Poland (NCN 2011/01/D/NZ9/02494).

PECTIN DISASSEMBLY UNDER MILD ACIDIC CONDITIONS**MERVE KAYA**, ANTÓNIO G. SOUSA, MARIE-JEANNE CRÉPEAU, SUSANNE O. SØRENSEN, and MARIE-CHRISTINE RALET

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Citrus pectins were subjected to acidic conditions for different hydrolysis times to isolate acid-resistant HG fractions. Samples extracted by milder conditions were rich in HG. Alkaline extractions followed by partial purification with chromatography allowed the recovery of RGI. How these isolated main pectin building blocks varied according to pectin extraction conditions and plant source will be discussed.

REACTION MECHANISM OF WHEAT DISTARCH PHOSPHATE OF LOWER AND HIGH DEGREE OF SUBSTITUTION DETERMINED BY ³¹P NMR**JAROSLAV KOLÁČEK^a**, EVŽEN ŠÁRKA^a, DAGMAR ŠIMKOVÁ^b, and PETRA SMRČKOVÁ^a

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The paper completes the data presented in (cit.¹) and deals with the esters of degree of substitution (DS) lower than $1.7 \cdot 10^{-3}$ and higher than $2.3 \cdot 10^{-3}$. Besides the distarch phosphate of lower DS, it was revealed monostarch monophosphate as well. When analysing reaction products of wheat starch in laboratory to obtain high degree of substitution (DS), cyclic-monophosphate as a reaction intermediate was not found. The chosen procedure enabled to reach DS of $2.62 \cdot 10^{-3}$.

REFERENCE

- Šárka E., Hrabal R., Koláček J., Smrčková P., Bubník Z.: Chem. Listy, in print.

This research was supported by the "Wheat with specific starch composition and features for food and non-food purposes" QJ1310219 research grant of the Ministry of Agriculture.

EFFECT OF MAGNESIUM, CALCIUM AND POTASSIUM IONS ON SELECTED PHYSICO-CHEMICAL PROPERTIES OF OCTENYL-SUCCINATE STARCH**KAROLINA KRÓLIKOWSKA***, TERESA FORTUNA, and PAULINA PAJĄK

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The aim of this study was to investigate the effect of magnesium, calcium and potassium ions on the selected physico-chemical properties of octenyl succinic anhydride starch. Potato starch was esterified with OSA at level 9 % (based on d.w. of starch) and enriched with magnesium, calcium and potassium ions. The content of minerals (Mg, Ca, K), water binding capacity, solubility in water and analysis of susceptibility to retrogradation and surface tension were conducted on the starch samples. Modification with minerals resulted in increase of solubility in water, furthermore caused a decrease of susceptibility to retrogradation and surface tension as compared to non-modified OSA starch.

The scientific research was realized within a framework of grant nr BM-4768/KAiOJŻ/2014 awarded from the Rector of University of Agriculture in Krakow, Poland.

EFFECT OF CASSIA GUM AND SODIUM CHLORIDE ON PASTING CHARACTERISTICS OF NATIVE AND MODIFIED POTATO STARCHES**DOROTA GALKOWSKA***, MICHAŁ POTOCZEK, and **KAROLINA KRÓLIKOWSKA**

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The aim of this study was to evaluate the effect of cassia gum and sodium chloride on pasting characteristics of native potato starch, distarch phosphate (E 1412), acetylated distarch phosphate (E 1414) and acetylated starch (E 1420). Presence of cassia gum at concentration of 0.25 % and 0.50 % resulted in increased viscosity of the starch systems, while it was markedly decreased in presence of NaCl.

ABSORPTION OF HEAVY METAL IONS FROM AQUEOUS SOLUTION WITH CATIONIZED OR SULPHONYLATED STARCH

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Barley starch was used to prepare binding agents for the removal of heavy metal ions from aqueous solution. Native starch was either hydrolyzed and subsequently cationized or sulphonylated. 1-allyl-3-methyl imidazolium chloride ([AMIM]Cl) was used as a reaction media. The ability of the modified starches to bind heavy metal ions from aqueous solution was studied in various conditions (e.g. the DS of starch). ICP-OES was used as an analytical method for the metal binding studies.

The financial support from Emil Aaltonen foundation and Maa- ja vesiteknikan tuki ry is greatly acknowledged.

COMPARISON OF CATALYTIC PROPERTIES OF LEVANSUCRASES LSC2 AND LSC3 OF *Pseudomonas syringae* PV. TOMATO

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Genome of *Pseudomonas syringae* pv. tomato encodes three levansucrases: Lsc1 (431 aa), Lsc2 (415 aa) and Lsc3 (431 aa). We have earlier thoroughly characterized Lsc3 protein. We report that Lsc2 protein is highly similar to Lsc3 according to catalytic efficiency of sucrose splitting, substrate specificity, polymerizing activity and spectrum of produced polymerization products.

This research was funded by the grant GLOMR9072 from Estonian Research Council and the ERF grant 3.2.0701.12–0041 (SLOMR12215T) managed by the Archimedes Foundation.

SYNTHESIS OF POLYAMPHOLYTE MICROGELS FROM PECTIN OR CELLULOSE AND THEIR APPLICATION AS pH-RESPONSIVE EMULSIFIERS

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A novel method for obtaining of cross-linked microgels on the basis of apple pectin or wood cellulose will be presented. This method is based on the Ugi four-component condensation in colloidal suspensions. Using various processing parameters cross-linked sub-micron and nanogels with controlled colloidal properties can be obtained. Polyampholyte microgels derived from the polysaccharides have proved to be pH-responsive Pickering emulsifiers at low concentrations.

HYALURONAN OLIGOSACCHARIDES INDUCE PROINFLAMMATORY RESPONSE IN DERMAL FIBROBLASTS

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Native hyaluronan HA supports tissue integrity and homeostasis and in case of injury also its regeneration. Hyaluronan oligosaccharides (oHAs) play a very different role in cellular behavior. oHA consisting of 4 to 12 monosaccharide units act as signal molecules which are able to increase expression of several proinflammatory chemokines (e.g. IL-8), production of proteases and regulation of other important features of inflammation in dermal fibroblasts.

MALIC ACID: A PLASTICIZER FOR BIODEGRADABLE FOOD PACKAGING THERMOPLASTIC STARCH FILMS?

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Retrogradation of amorphous thermoplastic starch (TPS) films obtained by compression molding of spray dried potato starch was investigated. The aim was to investigate the influence of plasticizers with similar molecular weight but different functionality, i.e. isoleucine, asparagine and malic acid, on the performance of powder and TPS films. Combinations of malic acid with glycerol, urea, and maltodextrin were also evaluated. Except for isoleucine formulated starch, all samples were obtained as amorphous powders and films. Malic acid was identified as a strong retrogradation agent as it inhibited recrystallization of starch over the full range of humidity levels. Malic acid was also found to inhibit the retrogradation of formulations containing urea, glycerol and maltodextrin. The converse of the strong inhibition implied strong moisture absorption and high strain at break values, and low tensile strengths. Malic acid was also identified as a potential cross-linking agent to control swelling of starch-based products.

CHARACTERIZATION OF A NEW POLYSACCHARIDE FROM *Cola millenii* SEEDS

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We have isolated and characterized a water soluble polysaccharide from the seeds of *Cola millenii*. The weight average molecular weight of the polysaccharide obtained by GPC/MALLS was $4.66 \cdot 10^6$ g mol⁻¹. The polysaccharide exhibited polyelectrolyte properties as the intrinsic viscosity varied with ionic strength. The high viscosity at low shear rates ($\eta_0 = 17.9$ Pa s at 1 % (w/v)) is indicative of potential for application as a stabilizer.

POROUS HYDROXYAPATITE CERAMICS PREPARED BY DRY POWDER PRESSING WITH SUCROSE AND BY SUSPENSION FOAMING TECHNIQUES USING WHEAT FLOUR AND OTHER PORE FORMERS

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Porous hydroxyapatite (HA) is used in biomedical applications, e.g. in the form of bone tissue engineering scaffolds. This work describes the preparation and characterization of porous HA ceramics shaped by uniaxial pressing of dry powders with sucrose and by suspension foaming techniques using other pore formers (wheat flour, yeast cells, carbonates). The microstructure (porosity, pore size) and mechanical properties of the porous HA ceramics are characterized.

This work is part of the project P108/12/1170 "Porous ceramics with tailored elasticity and thermal conductivity" (GAČR) and specific university research (MŠMT No. 20/2014).

THE INFLUENCE OF SEEDS EXTRACTS ON THE PHYSICAL PROPERTIES OF STARCH-BASED EDIBLE FILMS

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The aim of this study was to investigate the effect of seeds extracts on the physical properties of starch-based edible films. Starch/glycerol films were formulated from native potato starch with the addition of water/ethanolic extracts of *Nigella Sativa* L. and *Linum Flavum* L. seeds. Films were characterized by measuring of the thickness, solubility in water, textural and optical properties. The results shown that incorporation of plant extract into films matrix influenced their physical properties.

The scientific research was realized within a framework of grant no. BM-4774/KAiOJŻ/2014 awarded from the Rector of University of Agriculture in Krakow, Poland.

PHYSICOCHEMICAL PROPERTIES OF STARCH-MALTODEXTRIN-SUGAR SYSTEMS**JOANNA SOBOLEWSKA-ZIELIŃSKA*, PAULINA PAJAK, and MARTA LEBDOWICZ***Department of Food Analysis and Quality Assessment, Faculty of Food Technology, University of Agriculture in Krakow, Balicka 122 Str., 30-149 Krakow, Poland
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The aim of this study was to determine the influence of maltodextrin (MD), glucose (Glu) and sucrose (Suc) on the physicochemical properties of starch (S) gels. The tested systems S-MD; S-MD-Glu; S-MD-Suc were examined for rheological properties. The effect of the addition of maltodextrin and saccharides on the retrogradation of obtained systems was also specified. All tested gels were non-newtonian, shear thinning and yield stress fluids. The addition of sucrose resulted in an increase in the yield stress of gels. The addition of maltodextrin and sucrose inhibited the process of starch retrogradation.

SPECTROSCOPIC IDENTIFICATION OF POLYSACCHARIDES IN MEDICAMENTS AND FOOD SUPPLEMENTS**JAN PRAVDA, ROMAN BLEHA, ANDRIY SYNYTSYA, and JANA ČOPÍKOVÁ***Department of Carbohydrates and Cereals, ICT Prague, Technická 5, 166 28 Praha 6, Czech Republic
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Native and modified polysaccharides are applied in medicaments and food supplements for many reasons: as excipients, active substances or for their nutritional benefits. One of commonly used techniques for identifying of polysaccharides and their derivatives is FT-IR spectroscopy. However, analysis of relatively complex matrices such as medicaments and food supplements requires a complex approach before recording of FT-IR spectra. The review on analytical procedures will be published.

*Financial support from specific university research (MSMT No 20/2014).***EFFECT OF IRRADIATED WITH MICROWAVE ON TEXTURE PROFILE OF STARCHES GELS****IZABELA PRZETACZEK-ROŻNOWSKA*, JACEK ROŻNOWSKI, TERESA FORTUNA, and BEATA ROSIAK***University of Agriculture, Faculty of Food Technology ul. Balicka 122, 30-149 Kraków, Poland
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The aim of paper was investigate effect of irradiated starches with microwave at 440W or 800W on texture profile of starch gels measured by TPA method. The experimental material were potato, corn and wheat starches irradiated in a microwave oven using a power of 400W or 800W. There was found that the samples after modification were characterized by higher hardness, mastification and gumminess and also reduced the elasticity.

*The authors gratefully acknowledge financing of the work from the grant No.BM-4775 awarded by the Rector University of Agriculture in Kraków.***CHARACTERISTIC OF SAME PHYSICOCHEMICAL PROPERTIES OF CORN AND WHEAT SPELT STARCHES IRRADIATED WITH MICROWAVE AND ENRICHMENT WITH SELECTED MICRO- OR MACROELEMENTS****TERESA FORTUNA, IZABELA PRZETACZEK-ROŻNOWSKA*, JACEK ROŻNOWSKI, EMILJA DUTKA, and IWONA KOZIEL***University of Agriculture, Faculty of Food Technology ul. Balicka 122, 30-149 Kraków, Poland
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The aim of paper was examined a few selected of physicochemical properties of corn and spelt wheat starches irradiated with microwave at 800 W and enrichment with potassium, magnesium, copper or iron ions. The analysis included determination of protein, fat, amylose, phosphorus and retrogradation of 2 % starches pastas storage at 4 °C. The results shown that irradiation, enrichment and origin of starch influence on physicochemical properties of starch.

The study was conducted and financed from the funds allocated to a research grant of the Ministry of Science and Higher Education No. NN 312 43 80 37.

THE RHEOLOGICAL PROPERTIES OF CHEMICALLY MODIFIED STARCHES

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Chemically modified starches have been an integral and indispensable component of modern food products. The aim of the study was to characterize the rheological properties of some chemically modified starches. On the basis of the results statistically significant differences in terms of selected rheological parameters between the studied starches were found.

The project was funded by the National Science Centre allocated based on the number of decision DEC-2013/09/N/NZ9/01604.

THE RHEOLOGICAL CHARACTERIZATION OF MODEL EMULSIONS O/W STABILIZED ON MALTODEXTRINS BASED ON CHEMICALLY MODIFIED STARCHES

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Emulsions are dispersed systems composed of an oily phase dispersed in an aqueous phase. The aim of this study was to analyze selected rheological properties of model emulsion o/w, in which the dispersed phase solutions were maltodextrins based on stabilized and crosslinked starches. The test results found a significant effect of the type of modifications on the viscoelastic properties of model emulsions.

The scientific research was realized within a framework of grant no. BM 4777/KAiOJZ/2014 financed from budget of University of Agriculture in Krakow, Poland.

BIOLOGICALLY ACTIVE POLYSACCHARIDES FROM MARINE ORGANISMS AND PROSPECTS FOR THEIR USE IN HUMAN AND VETERINARY MEDICINE

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The research devoted to the way of use inedible parts of marine organisms as a source of biologically active polysaccharides that have chondroprotective and anticoagulant effect. Technology for deriving of hyaluronic acid from fish offal was developed. Hyaluronic acid obtained from the tissues of different taxa of fishes (cartilaginous and teleostei) were characterized.

FORMATION OF ALUMINA-CONTAINING ALGINATE HYDROGELS VIA IONOTROPIC GELATION, DEWATERING KINETICS AND XEROGEL MICROSTRUCTURE

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Alumina-containing hydrogels with parallel arrays of highly anisometric capillary pores were prepared by ionotropic gelation of alumina-containing sodium alginate solutions with calcium chloride (ion-exchange leads to network formation). By dewatering in polyethyleneglycol solutions and subsequent drying, xerogels were obtained, which were studied by microscopy and mercury porosimetry and could be transformed into porous ceramics by subsequent firing.

This work is part of the project P108/12/1170 “Porous ceramics with tailored elasticity and thermal conductivity” (GAČR) and specific university research (MŠMT No. 20/2014).

PHYSICO-CHEMICAL PROPERTIES OF LABORATORY PREPARED EXTRUDED PRODUCTS

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The set of 28 samples was prepared on a laboratory extruder KE 19/25 (Brabender, Germany). Native wheat starch and fine corn grits with the addition of 0, 5 or 10 % of chemically modified starches were used as input materials. The water addition to the feed mixture was set to 5 and 10 %. The dosing speed, the temperatures along the barrel, the screw speed, the compression ratio of the screw, and the pressure near the extrusion die were monitored during the experiments. The expansion ratio, colour, bulk density, water holder capacity (WHC) and water soluble index (WSI) were determined in obtained samples. The influence of extrusion parameters on the physico-chemical properties of extruded products is discussed.

This research was supported by the “Wheat with specific starch composition and features for food and non-food purposes” QJ1310219 research grant of the Ministry of Agriculture.

SELECTION OF RYE FLOUR TYPE FOR THE RYE SOUP LEAVEN MANUFACTURING

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The effect of rye flour type on process dynamics of rye soup leaven (żurek) production was evaluated. The process was carried out by means of a spontaneous fermentation at four different temperatures (24–36 °C) for 3 days and it leads to extensive changes in polysaccharides and proteins contained in flour. Basing on both, the sensory quality and the results of chemical and microbiological analyses the żurek obtained from 720-type flour after its 72-hour fermentation at 3 °C was recognized to be the best.

ENZYMATIC ASSAY FOR CHARACTERIZATION OF GLUCOSE-BASED POLYSACCHARIDES DIGESTIBILITY IN CEREAL FOOD – AN INTERLABORATORY STUDY

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The aim of this study was to validate the method for determination of rapidly and slowly available glucose and total glucose after enzymatic hydrolysis and to determine the uncertainty of measurement for further use. The study involved three laboratories and three different cereal-based samples with various demands on sample preparation that is the key source of inconsistent results.

This work was supported by Ministry of Agriculture of the Czech Republic (Project no. MZe ČR QJ1310219 and project no. MZe ČR RO0414).

EFFECT OF HYDRATED CHIA SEEDS ON CHARACTERISTICS OF WHEAT FLOUR

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Wheat flour was supplemented by chia wholemeal from white and brown seeds (2.5 %, 5.0 %). Both chia type softly increased proteins content and reversely influenced their quality (up to 0.5 % and 25 %, respectively). Low amounts added caused small changes in dough viscoelastic properties during its kneading or uniaxial deformation. Consumer's quality worsening of bakery products was also of low significance (i.e. volumes 270 for non-enhanced and 287–320 ml/100 g for chia-enriched bread).

This research was supported by the project QI 111 B053 (Ministry of Agriculture).

INFLUENCE OF VARIOUS CONCENTRATIONS OF PECTINS AND HEMICELLULOSES ON CELLULOSE STRUCTURE – APPLE CELL WALL

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Plant cell walls and their constitutive polysaccharides networks are vital with regards to plant organ mechanical properties like stiffness or strength. The basic components of plant cell wall are cellulose fibrils embedded in matrix polysaccharides. The main matrix polysaccharides are pectins, hemicelluloses (mainly xyloglucan) and also other constituents like protein and phenolic compounds.

The first aim was to measure cellulose crystallinity degree, structure and cellulose microfibrils arrangement during the apple development to answer for the question whether maturing affects crystallinity. The second, was to determine the influence of pectins and hemicelluloses on structure of cellulose.

This work was funded by National Science Centre Poland (NCN 2011/01/D/NZ9/02494).

INFLUENCE OF VARIOUS CONCENTRATIONS OF PECTINS AND HEMICELLULOSES ON CELLULOSE STRUCTURE – BACTERIAL CELLULOSE

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Nanocomposites of bacterial cellulose produced by *Acetobacter xylinus* are considered to mimic cellulose composites to be found in natural plant cell walls. A model material composed of bacterial cellulose cultured in medium with addition of apple pectin and tamarind xyloglucan were used. The aim of investigations was to determine the influence of various concentrations of non-cellulosic polysaccharides (pectins and xyloglucan) on cellulose microfibrils structure and arrangement.

This work was funded by National Science Center Poland (NCN 2011/01/D/NZ9/02494).

FLUOROPHORE-LABELLED HYALURONAN

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Hyaluronan (HA) is extensively used for various medical and tissue engineering applications. Fluorescent labelling of this biologically important polysaccharide is useful for imaging and mapping of HA interaction with cells and in studies of its tissue and skin penetration. A new approach for labelling of HA *via* reductive amination strategy was developed and covalent attachment of fluorescent marker (Rylux BSU) was proved by advanced LC methodologies.

EFFECT OF DIFFERENT REACTION CONDITIONS ON THE DEGREE OF SUBSTITUTION OF PALMITOYL HYALURONAN

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The goal of this work was to prepare highly hydrophobized Hyaluronan by esterification with palmitoyl chains (HA-C16). Different experimental variables were systematically studied in order to tailor-made the degree of substitution (DS); e.g. MW of polysaccharide, feed molar ratio of reaction components, temperature, mixing speed and solvent polarity to effect semi production scale-up of these derivative.

REFERENCE

1. Šmejkalová D., Huerta-Angeles G., Bobek M., Hermannová M., Vištejnová L., Novotný J., Příkopová E., Nešporová K., Němcová M., Šlezingrová K., Kulhánek J., Čožíková D., Šógorková J., Kučera J., Klein P., Velebný V.: C6-C18-acylovaný derivát kyseliny hyaluronové, způsob jeho přípravy, nanomicelární kompozice na jeho bázi, způsob její přípravy a stabilizace a její použití. PV-2012-842 (PCT 23.09.2013).

APPLICATION OF HANSEN SOLUBILITY PARAMETERS FOR PREDICTION OF DRUG DISTRIBUTION IN HYALURONAN NANOCARRIERS

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One of the most important properties of polymeric nanocarriers is their loading capacity. To optimize this performance, the current practice is to apply trial and error approach, which is both time and cost consuming. In this work, applying Hansen solubility parameters, we developed a thermodynamic model for hydrophobized hyaluronan derivatives, which predicts drug-polymer compatibility with 90% reliability when compared to experimental data.

PREPARATION OF PERSPECTIVE POLYSACCHARIDE DERIVATIVES

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Polysaccharides belong to the most abundant organic materials in the Earth. Many types of polysaccharides are used for preparing of various derivatives with application importance. Among them, chitin or chitosan and β -glucans have many applications including food, pharmacy, medicinal materials, cosmetics etc. Chitin or chitosan and β -glucans are present in chitin-glucan complex in molds and mushrooms and they can be modified together in one material. For modification were used isolated polysaccharides (chitin and β -glucans). Both chitosan and β -glucans contain reactive groups and thus may undergo further chemical modifications to obtain novel perspective derivatives. This work is focused on carboxylation of chitosan and β -glucans with following methylesterification and amidation of carboxymethylchitosan and carboxymethylglucan with *n*-alkylamines and other reagents. Substitution degree and purity of the reaction products were monitored by organic elemental analysis and spectroscopic methods. Analytical methods confirmed preparation of highly substituted or moderately substituted *N*-alkylamides, hydrazides and hydroxamic acids. Hydrophobically modified derivatives containing long

alkyl substituents have potential use in pharmacy as sorbent of active substances.

This work was supported by the Czech Science Foundation (project No. 503/11/2479) and by the Specific University Research (project No. 20/2014).

INFLUENCE OF ETHANOL ADDITION ON THE MICROSTRUCTURE OF CERAMIC FOAMS PREPARED BY YEAST-MEDIATED BIOLOGICAL FOAMING OF ALUMINA SUSPENSIONS

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Ceramic foams have been prepared by biological foaming of alumina suspensions using baker's yeast *Saccharomyces cerevisiae* (sucrose \rightarrow carbon dioxide + ethanol) with potato starch added as a foam stiffener, followed by drying and subsequent firing at 1570 °C. The influence of ethanol addition on the microstructure of fired samples, in particular porosity and pore size, was studied by optical microscopy with image analysis and by electron microscopy.

This work is part of the project P108/12/1170 "Porous ceramics with tailored elasticity and thermal conductivity" (GAČR) and specific university research (MSMT No. 20/2014).

CLINICAL TRIALS OF β -GLUCAN: EXPERIENCE FROM THE CZECH REPUBLIC

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Since glucan therapy has achieved great success in preclinical animal models, significant efforts have been made to determine their therapeutic efficacy in humans. Some of clinical trials are under way in the Czech Republic. From our results we can conclude that glucan administration might be considered as an inexpensive method in the treatment of chronic respiratory problems in children. In addition, we showed that oral administration of glucan has positive effects in patients suffering from benign prostate hyperplasia.

METHOD OF ISOLATION AND PARAMETERS OF TOXICITY OF SAPROPHYTIC STRAINS *Bacillus* GENUS

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We report the method of isolation, characterization, toxicity of *Bacillus polymyxa* 102 KGU and *Bacillus subtilis* IMB 668. The definition of acute toxicity as one of major pharmacological indexes of drugs which have been based on two animal species with different routes of introduction showed that the searched *Bacillus* lectins relate to mild and low-toxic substances (LD50 for *Bacillus polymyxa* lectin 102 is 248 mg / kg, and for *Bacillus subtilis* lectin 668 is 89 mg / kg).

METHOD OF PREPARING AND BIOLOGICAL ACTIVITY OF PREPARATIONS ON THE BASE OF *Bacillus* LECTIN AND HETEROCYCLES

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Pronounced antitumor effect with high % of tumor growth inhibition was registered in Pliss lymphosarcoma for the following complexes: *Bacillus polymyxa* 102 – bis-derivative of 5-methyluracil (% inhibition of tumor growth – 62.8 %); *Bacillus polymyxa* 102 – bis-derivatives of 6-methyluracil (% inhibition of tumor growth – 62.5 %).

MAGNETIC NANOPARTICLES AND THEIR HYBRIDES

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The synthesis of magnetic nanoparticles has become a matter of great interest in recent times due to their

various advantageous properties and applications in a variety of fields. Magnetic nanoparticles and their bioconjugates have emerged as a promising material for biosensing that provide a useful complement to more traditional sensing techniques. Biomolecules functionalized iron-based nanoparticles exhibit promising hybrid potential for use in advanced biosensors.

This study was supported by APVV-0125/11 and VEGA-2/0040/14 projects.

MODIFICATION OF POTATO PEELING WASTE WITH BASE HYDROLYSIS AND SUBSEQUENT CATIONIZATION

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Potato peeling waste is a surplus material of food industry. Starch of the peeling waste could be utilized as an alternative source of native starch. In this study, we have investigated potato waste starch pretreated by base hydrolysis and its effect on the water solubility and cationization of starch. NaOH was used as base and glycidyltrimethylammonium chloride as the cationization reagent. Products were studied by HPLC-ELSD and NMR.

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