ANEXA 3.5.10.b.

SOCIETATEA DE CHIMIE DIN ROMÂNIA
Filiala Arad

International Symposium Research and Education in Innovation Era

4th Edition

CHEMISTRY AND APPLICATION FIELDS

Book of abstracts

November 8th – 9th, 2012
Arad

CHEMISTRY AND APPLICATION FIELDS

- CHEMISTRY-

PL 1. EFFICIENT METHODOLOGIES IN HETEROCYCLIC SYNTHESIS – OPEN DOORS TO NEW PHARMACOLOGICAL ENTITIES

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In the course of our studies on the synthesis of functionnalized heterocycles with potential biological properties, we brought our research interest towards the design and the synthesis of original molecules likely to get medicinal activities at the pathologies of central nervous system, cancer, metabolic and cardiovascular diseases, chronic and neuropathic pain, osteoporosis.

Concerning the central nervous system (CNS), we are interested in serotoninergic receptors 5-HT7 [1]. Among the seven subtypes of receptors that mediate the serotonin (5-HT) functions [2], the 5-HT7Rs are the latest discovered (1993) [3]. Their distribution both in the central nervous system and in peripheral tissues is highly associated with their implication in psychiatric disorders, depression, anxiety and mood, learning and memory, inflammatory processes, just to cite a few recent studies on 5-HT7 complex system [4].

Therefore, the 5-HT7 receptor may be a novel and valuable drug target, so the development of its potent ligands is of key importance.

In recent years, our research group has been involved in the development of new compounds able to selectively bind to the 5-HT7 receptor over 5-HT1A receptor [5]. In the present lecture, we describe the optimization efforts that led to the discovery of new hits by chemical modification. We report the synthesis to dihydropyranopyridines [6] and benzimidazolones [7,8], the pharmacomodulation realized for increased selectivity, and studies on the efficacy of theses ligands determined on the cAMP-mediated signalling pathway in a recombinant expression system.

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PL2. COMPOSITIONAL AND STRUCTURAL ANALYSIS OF GANGLIOSIDES IN HUMAN FETAL CEREBELLUM BY CHIP ELECTROSPRAY MASS SPECTROMETRY

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We report here on a preliminary investigation of ganglioside composition and structure in normal human fetal cerebellum in the 15th and 30th gestational week, respectively, which were subjected to NanoMate HCT MS and CID MS analysis under identical experimental conditions. Recently, our group has demonstrated that adequate chip MS and automated chip ESI MS^n experimental conditions, protocols, and strategies such as those based on collision-induced dissociation (CID) may lead to successful implementation of this technology in glycomics in general and glycolipidomics including ganglioside analysis in particular [1, 2, 3].
The native ganglioside mixtures analyzed in this study were purified from fetal cerebellum, in the 15th gestational week (Cc15) and 30th gestational week (Cc30). Both fetuses where deceased antepartum; no signs of brain malformation, aberrant development or injuries were found during pedopathological examination, including histopathological tissue analysis. Fetal brain samples were obtained during routine pedopathological section/autopsy examination at Clinical Hospital for Obstetrics and Gynecology "Petrova", Zagreb, Croatia. Hence, the brains were considered normal for the respective gestational period. Both brain samples were weighed and stored at -20^{O}C until the ganglioside extraction procedure.
Mass spectrometry was conducted on a High Capacity Ion Trap Ultra (HCT Ultra, PTM discovery) mass spectrometer from Bruker Daltonics, Bremen, Germany. The robot was coupled for the first time to the HCT Ultra mass spectrometer by a custom-made mounting system, which allows robot O-xyz positioning with respect to HCT counter electrode [4].
We developed here a modern methodology for the investigation of ganglioside expression and structure in fetal cerebellum. Due to the high sensitivity for detection and sequencing of minor carbohydrate species in complex mixtures, speed of analysis and other here demonstrated advantages, the chip-based nanoESI HCT MS and CID MS^n has the potential to be introduced in medical diagnostics for comparative compositional and structural analysis of homologous biological glycoconjugates from either tissues or body fluids.

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PL3. EMISSION OF VOLATILES ORGANIC COMPOUNDS FROM STRESSED PLANTS

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In the nature plants are under a multitude of different stress factors. In response to biotic or abiotic stresses plant elicited volatile organic compounds (VOC). One species can emit until 1000 different compounds. Among of them, one plant can emit until 20 different monoterpenes. Plants emission patterns change both quantitatively and qualitatively as well in riposte to damage by biotic or abiotic stress.

In the present work we focus our study to the emission of volatile organic compounds from *Alnus glutinosa* and *Quercus* genus under biotic and abiotic stresses.

In case of *Alnus glutinosa* the cumulative stress of drought and herbivores was employed. Hebrew Character *(Orthosia gothica)* (Lepidoptera: Noctuidae) were used as herbivores and emission of VOC were trapped in the carbotrap tubes and characterized using a gas-chromatography mass-spectrometry (GC-MS) technique.

The emission of volatile organic compounds from heat stress in the *Quercus* genus will be discussed.

OC1. DETERMINATION OF DECORIN CHONDROITIN/DERMATAN SULFATE EXPRESSION IN HUMAN EMBRYONIC KIDNEY CELLS BY FULLY AUTOMATED CHIP-BASED NANOELECTROSPRAY MASS SPECTROMETRY

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Decorin (DCN) is a small chondroitin/dermatan sulfate (CS/DS) proteoglycan widely found in extracellular matrix which can modulate the cell proliferation and differentiation [1,2]. For structural investigation of CS/DS glycoforms, development of high performance specific methods is required. Among these methods, chip-based nanoelectrospray ionization (nanoESI) mass spectrometry contributed as an essential progress to the field [3-5]. In this study, human embryonic kidney, HEK293 cells were transfected with human decorin cDNA; decorin (0.5 mg of protein) was fractionated by DEAE anion exchange chromatography and CS/DS hybrid chains were released by β-elimination and digested with chondroitin AC I lyase. Octasaccharide fraction pooled from size-exclusion chromatography was structurally investigated by fully automated chip-based nanoESI MS on an orthogonal hybrid quadrupole time-of-flight (QTOF) instrument coupled to NanoMate^{TM} 100 incorporating ESI Chip technology via a mounting bracket. Tandem MS was performed by collision induced dissociation (CID) at low energies using argon as the collision gas. An aliquot of HEK293 DCN CS/DS octasaccharide fraction pooled from SEC was automatically infused into the QTOF MS by chip-nanoESI. MS screening reveals the presence of four major signals related to ions of high charge state as a result of multiple molecule deprotonation under chip-nanoESI conditions. Three multiply charged ions of the same molecular species having the composition of a tetrasulfated octasaccharide with one double bond, hybrid [4,5-Δ-GlcAGalNAc (IdoAGalNAc)$_3$](4S), exhibit a regular sulfation pattern in which the number of sulfate groups equals the number of disaccharide repeats. The low intensity signal corresponds to a $[M\text{-}3H]^{3-}$ ion which was assigned a [4,5-Δ-GlcAGalNAc(IdoAGalNAc)$_3$](3S) composition. These aspects, together with the method sensitivity, had beneficial consequences upon the detection of species having different number of sulfates.

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OC2. CELL-PENETRATING PEPTIDES: FROM DESIGN TO *IN VITRO* AND *IN VIVO* APPLICATIONS

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The delivery of therapeutic agents for the hard-to-treat human tumors is restricted by inefficacy and non-selectivity of systemically administered drug delivery vectors. Therefore, novel approaches aimed at increasing the specificity and in turn the treatment efficacies of therapeutic drugs are required. During recent years, drug delivery systems, which comprise both targeting and anticancer received much attention. In this regard, the application of cell-penetrating peptides (CPPs) appears to be a very promising strategy for targeted drug delivery. Cell-penetrating peptide based vehicles have been developed for the delivery of different payloads into the cells in culture and in animals, such as nucleic acids (DNA, RNA, oligonucleotides), proteins, drugs, etc. However, similar issues as for any other drug delivery system: cytotoxicity and the tendency to induce innate immune response may limit their use. The preclinical applications of CPPs, the characterization of immunogenic and cytotoxic activities of new CPPs, the cytotoxic and apoptotic activities of newly designed cell-penetrating p53 protein analogues and the development of a peptide-based glioma-targeted drug delivery vector will be described.

OC3. CHIP-BASED ELECTROSPRAY IONIZATION TANDEM MASS SPECTROMETRY A NOVEL TOOL FOR RAPID DIAGNOSTIC OF FABRY DISEASE

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Fabry disease is characterized by the absence or reduction of the α-galactosidase A activity with accumulation of globotrioasylceramide. In recent years, a new diagnostic method for detection of α-galactosidase activity from dried blood spots (DBS) using a chemical substrate and quantification of reaction mixture was developed [1,2]. To detect the enzyme cleavage products and increase the reproducibility and throughput, we introduce here an innovative analytical approach based on chip-nano electrospray ionization (ESI) mass spectrometry (MS). The enzyme assay products derived from DBS of 11 healthy donors and two Fabry disease patients were automatically infused by NanoMate robot into MS, under identical conditions. The cleavage of substrate GLA-S generated a product, GLA-P, which was quantified related to an internal standard GLA-IS. Due to the high sensitivity and reproducibility provided by chip-nanoESI MS, comparative analysis patient *vs.* control indicated a 13 fold reduction in GLA-P/GLA-IS ratio in the case of the patients.

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OC4. ATOMIC FORCE MICROSCOPY AND CONFOCAL RAMAN SPECTROSCOPY: TOOLS IN APPLIED TECHNOLOGIES

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The diversity of atomic force microscopy (AFM)/Raman applications has begun to expand. AFM/Raman is opening exciting new avenues in research as well as industrial characterization across a wide array of fields. In nanotechnology, it has easily characterized and imaged carbon nanotubes, carbon films, as well as activated and mapped the light transport in nanowires. In biology, this combination has imaged and collected spectra from single molecules (e.g. bacterial and animal cells). In semiconductors, it has been used to map the location of germanium in doped silicon and, using the high resolution of today's spectrometers, to detect delicate strain in silicon crystals. It is the next logical step in the powerful convergence of imaging and spectroscopy, dramatically expanding the analyst's toolbox.

Advances in surface characterization techniques, particularly the application of atomic force microscopy (AFM) imaging since 1990s in cellulosic research, have given additional information and verification of cellulose morphological structures. The aim of this work was to explore chemical and morphological changes in cellulose after treatment of hemp and cotton fibres in order to obtain new textiles and paper by using confocal Raman microscopy and AFM technique and also to show the potential of this technique in cellulosic research.

PC1. FOLATE-BASED NANOBIODEVICES FOR INTEGRATED DIAGNOSIS/THERAPY TARGETING CHRONIC INFLAMMATORY DISEASES

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It is estimated that inflammatory diseases affect more than 80 million people worldwide leading to untold suffering, economic loss and premature death. Considering life expectancy in Europe, these numbers are expected to increase in the next 20 years. Moreover, studies have shown that disorders such as rheumatoid arthritis (RA) can shorten life span by 10 years.

The treatment of chronic inflammatory disorders, including RA, remains a challenge for the medical and scientific community. The emergence of newdrugs creates new options though it also entails high costs, complicated drug administration, allergic reactions and potentially fatal side effects.

Therefore more efficient strategies have to be identified in order to improve inflammatory disease treatment while decreasing the side effects with an improved cost-benefit ratio.

Nano-enabled drug delivery systems will take therapy of chronic inflammatory disorders to a new level by creating a new, highly specific and efficient strategy, with reduced treatment costs.

PC2. STUDY OF THERMALLY INDUCED INTERACTIONS BETWEEN BENZOIC ACID AND THE MAIN COMPOUNDS OF WHEAT FLOUR

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This paper presents the study of thermally induced interactions between benzoic acid, used as preservative, and the major compounds of wheat flour, namely starch [1] and gluten [2].There are occurring complex processes during the thermal treatment of the mixtures of flour with different additives, flavors, enzymes or ingredients that are frequently added to wheat flour doughs to obtain various finished products.

Therefore, the study of thermal behavior of wheat flour, on the one hand, and of additives that are used in products based on wheat flour, on the other hand, is very important, but not enough. The elucidation of processes that occur in mixtures of flour with additives is imperious necessary.

Here it started the idea of the identification of thermally induced interactions between the compounds of the flour and additives, in this case, benzoic acid (BA). Benzoic acid – E210 is a preservative agent, frequently used in products based on flour. It acts as an inhibitor in the development of microorganisms (bacteria, yeasts and molds) [3], even at very low concentrations.

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PC3. THE INFLUENCE OF THE NATURE AND FATTY ACIDS CONTENT ON THE THERMAL STABILITY OF THE OILS FROM TECHNICAL PLANTS SEEDS

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Practical applications of the oils from technical plants seeds often involves oxidative processes which can destroy theirs structure and affects the physical and/or chemical properties.

The thermal decomposition of oils from technical plants seeds (flaxseed, hempseed and rapeseed) was investigated using simultaneous thermal analysis TG+DTG/DTA, in air atmosphere. Between the 35-600°C temperature range, the analyzed oils showed three main decomposition stages due to the degradation of saturated and unsaturated fatty acids. In order to study the influence of the nature and fatty acids content on the thermal stability of the oils, the TG+DTG/DTA curves of unsaturated (oleic, linoleic, linolenic) and saturated (palmitic and stearic) acids were also recorded under the same experimental conditions. The obtained results indicated that, the thermal stability of the investigated oils was dependent on fatty acids composition and was influenced by the presence of the natural antioxidants. According to the initial decomposition temperatures (T_{onset}), the following thermal stability sequence is proposed: *hempseed oil < rapeseed oil < flaxseed oil.* The thermal stability sequence for the investigated oils is in good agreement with that obtained for fatty acids: *linoleic acid < oleic acid < stearic acid < palmitic acid< linolenic acid.*

PC4. QUANTITATIVE DETERMINATION OF KAMPFEROL FROM *APIUM GRAVEOLENS* AND *PETROSELINUM CRISPUM* SPECIES USING HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

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The aim of this paperwork is the quantitative determination of kampferol from the *Apium graveolens* and *Petroselinum crispum* plant extracts.

The quantitative analysis of kampferol was made using high performance liquid chromatography (HPLC).

The researched species were: *Apium graveolens*; *Petroselinum crispum*. From the results obtained after the analyses one can see that the highest content in kampferol (0.0021 mg/mL) is found in the *Petroselinum crispum* extract, while the *Apium graveolens* has a lower content in kampferol (0.0019 mg/mL).

PC5. THERMALLY INDUCED INTERACTION BETWEEN SIMULATED FLOUR AND AMMONIUM DIHYDROGENPHOSPHATE

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Very frequently, in the food industry, it appears the necessity of changing the ratio of the two major components of flour, i.e. the gluten.

The topic of this work is to study the thermally induced changes in simulated flour, taking into account the individual thermal behaviour of the two above mentioned major components. Also, a comparison with natural wheat flour was discussed.

The flour samples, i.e. native starch (A), and the gluten (G), simulated flour (SF) with 90 mass% A and 10% G and a natural wheat flour (HF) were studied by means of thermoanalysis under non-isothermal conditions and FTIR spectrometry using UATR technique

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PC6. DETERMINATION OF MOLECULAR EXPRESSION AND STRUCTURE OF GANGLIOSIDES IN BRAIN METASTASIS OF LUNG ADENOCARCINOMA BY NANOMATE-QTOF MS AND MS/MS

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Gangliosides (GGs), sialic acid-containing glycosphingolipids, are known to be involved in the invasive/metastatic behavior of brain tumor cells [1, 4]. In this context, we report here on the first optimization and application of chip-based nanoelectrospray (NanoMate robot) mass spectrometry (MS) for the investigation of gangliosides in a secondary brain tumor. In our work a native GG mixture extracted and purified from brain metastasis of lung adenocarcinoma was screened by NanoMate robot coupled to a quadrupole time-of-flight MS. A native GG mixture from an agematched healthy brain tissue, sampled and analyzed under identical conditions, served as a control.

Three years following surgery for lung tumor removal, a male patient (73-y-old) reports neurological symptoms such as sudden occipital headaches, dizziness, nausea, and lack of coordination. The sample of normal human cerebellum (male, 79-y-old) was dissected to serve as a control; it was obtained from the Department of Forensic Medicine, School of Medicine, University of Zagreb, Croatia. Ganglioside extraction was performed according to the method of Vukelić et al. Ganglioside mixtures isolated and purified from brain metastasis of lung adenocarcinoma and normal cerebellar brain tissue used as control were analyzed in parallel. MS was performed on a QTOF Micro instrument (Waters, Manchester, UK). Fully automated chip-nanoESI was performed on a NanoMate 400 robot (Advion BioSciences, Ithaca, NY, USA) mounted to the QTOF MS.

Qualitative analysis of GG pattern from brain metastasis sample using HPTLC showed the fractions migrating as GM3, GM2, and less or no visible fraction. In the sample obtained from brain metastasis, the GG fraction with migration properties of GM3 was the major one, accounting for 52.27% of the total GG content followed by GM2 with 34.81%, while proportions of more complex structures (GM1, GD1a, GD1b, and GT1b) were lower compared with healthy brain tissue. While in MS of brain metastasis sample only singly charged ions are present, MS profile of normal cerebellum GG extract is characterized by the presence of singly, doubly, and even triply charged ions. Healthy cerebellar tissue was found to contain a higher variety of GG structures differing in their sialylation degree, from short, monosialylated (GM) to large, polysialylated carbohydrate chains (GH) and also ganglioside chains modified by O-acetyl (O-Ac) and fucosyl (Fuc) attachments. In contrast to healthy cerebellar tissue, the ganglioside mixture extracted from brain metastasis of lung adenocarcinoma exhibits mostly species of short oligosaccharide chains and reduced overall sialic acid content. More than a half, from the total of 59 different ions detected and corresponding to 125 possible structures in brain metastatic tissue, represent monosialylated species of GM1, GM2, GM3, and GM4-type. GG composition of brain

metastasis sample was found to be highly altered in comparison to the composition of healthy human brain [3].

Chip-nanoESI QTOF MS and CID MS/MS were able to provide compositional and structural characterization of native ganglioside mixtures from secondary brain tumors with remarkable analysis speed and sensitivity [4]. For all these reasons, the bioanalytical platform demonstrated here for determination of GSL molecular markers in brain tumors has real perspectives of development into a routine, ultrafast, and sensitive method applicable to other types of cancer and molecular markers.

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PC7. HIGH RESOLUTION MASS SPECTROMETRIC CHARACTERIZATION OF MALTOSE DERIVATIVES

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The analysis of neutral disaccharides by electrospray ionization (ESI) mass spectrometry (MS) represents a challenge due to the poor ionization properties exhibited by this class of compounds, problems which are overcome by sample derivatization. To extend the applicability of ESI QTOF mass spectrometry to the analysis of disaccharides we introduce here a novel derivatization strategy based on functionalization with aromatic amines.

Maltose was functionalized with 4,4'-diamine-diphenyl-methane by reductive amination reaction. Resulting modified maltose was purified, isolated and submitted to ESI QTOF. MS experiments were conducted on a nano-electrospray ionization quadrupole time-of-flight mass spectrometer (Micromass, Waters, Manchester, UK). All mass spectra were acquired in the positive ion mode. MS^2 experiments were carried out by collision-induced dissociation (CID) using argon as the collision gas at low energies.

The aromatic amine linker possesses an increased proton affinity which dramatically improved the detection of maltose by Nano ESI QTOF. MS^2 compositional and structural data were obtained in a high throughput regime.

A novel method based on derivatization with aromatic amines followed by direct nanoESI MS and MS/MS was here developed for maltose derivatives structural analysis. This method is ultrafast, sensitive and accurate. These attributes combine to make it a method of choice in modern glycomics.

PC8. CHIP-BASED NANOELECTROSPRAY MASS SPECTROMETRY OF FRUCTOOLIGOSACCHARIDES PRODUCED BY LEVANSUCRASES FROM PSEUDOMONAS SYRINGAE PV. TOMATO AND P. CHLORORAPHIS SUBSP. AURANTIACA

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Levansucrases of *Pseudomonas syringae* pv. tomato DC3000 (Lsc3) and *Pseudomonas chlororaphis* subsp. *aurantiaca* (LscA) have 73% identity of protein sequences, similar substrate specificity and kinetic properties. Both enzymes produce levan and fructooligosaccharides (FOS) of varied length from sucrose, raffinose and sugar beet molasses. For mass spectrometry analysis of synthesized FOS, 460μg of LscA were incubated in 1 ml McIllvaine's buffer with 1200 mM of sucrose or raffinose at 37◦C for 20 h. The reaction mixtures and control samples were diluted three times in deionized water/methanol/formic acid (4:4:1, v/v/v) and centrifuged (20 min) at room temperature. Fully automated chip-based nanoelectrospray mass spectrometry was performed on a NanoMate 400 robot (Advion BioSciences, NY, USA) coupled with a high-capacity ion trap mass spectrometer (HCT MS) from Bruker Daltonics (Bremen, Germany).[1,2] The most interesting outcome of this work we emphasize the ability of Lsc3 and LscA to transfructosylate various nonconventional acceptors producing heterooligofructans. The products can have novel or enhanced physiological effects and thereby applications of their own, but they can also serve as starting material for the synthesis of new oligosaccharidic products.[3]

The ability of d-sorbitol, xylobiose, d-galacturonic acid, d-mannitol, xylitol and methyl-d-glucopyranoside to serve as fructosyl acceptors for levansucrases is shown for the first time. A novel high-throughput chip-based nanoelectrospray mass spectrometric method was applied to screen alternative fructosyl acceptors for levansucrases.

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PC9. SYNTHESIS AND PHYSICO-CHEMICAL STUDY OF SOME COMPLEXES WITH CATALYTIC PROPERTIES

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Synthesis, characterisations and thermal behavior of $Na_2[MoO(O_2)_2(C_2O_4)]$ was studied. The thermally induced events will be observed by comparing the FT-IR spectra of the initial compound and of the char at 300 °C and 500°C.

The TG data were obtained at different heating rates: β = 2.5, 4, 5 and 10 ˚C·min-1 and the TG/DTG data were processed with the following methods: Freidman, Flynn-Wall-Ozawa and Budrugeac-Segal - Popescu method.

The Budrugeac- Segal - Popescu method presents a very good descriptive ability, so it is useful for simulations of the thermal behavior.

The specificity of the thermal decomposition was characterized by identification of the bond to be selective activated due to energy absorption at vibrational level. These bonds were assigned by comparison of calculated wave numbers with the wave number of the IR spectra.

PC10. **SYNTHESES OF IMMOBILIZED ENZYMES IN/ON CRYOGEL POLYMERS**

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Laccases are oxidoreductases (benzenediol: oxygen oxidoreductase; EC 1.10.3.2) with a large number of applications in different fields like: food, textiles, environment [1-6]. The advantages of using such enzymes reside in their reduce selectivity towards the substrate which enlarge their area of application. Laccases are capable to oxidize many compounds, but polyhydroxy-phenols are the best substrates for these enzymes.

The cofactor in laccase oxidation is oxygen which is usually turned into water by taking the hydrogen from the oxidized substrate. The reaction of oxygen is as follows [7]:

$$4H^+ + 4e^- + O_2 \rightarrow 4H_2O$$

The disadvantages regarding laccases are their reduced stability as free enzymes. A solution for solving this problem is the synthesis and use of immobilized enzymes instead of the free laccases. There are different procedures for immobilization, as well as different carriers to be used [8].

Cryogel polymers are one of the best carriers for enzyme immobilization [9]. This fact is due to their biological compatibility, their mechanical resistance and last but not least to their macro-porous structure suitable for including also large molecules.

This work presents the structure of two type of functionalized cryogel polymers and the preparation of new biocatalyst through two immobilization procedures: covalent (a) and coordinative (b):

(a) Cryogel PVA Polymer-CHO +H_2N-Enzyme → Cryogel PVA Polymer-CH= N-Enzyme

(b)

The characteristics of the new biocatalysts, obtained by using either a commercial enzyme or a laboratory prepared one, are presented and also their practical application in food industry and waste water treatments [10-12].

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PC11. ANALYTICAL METHOD FOR DETERMINATION OF BIOGENIC VOLATILE ORGANIC COMPOUNDS

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BVOC plays an important role in the formation of the atmospheric pollutant ozone in the troposphere and formation of aerosols. A new gas-chromatographic-mass spectrometry (GC-MS) method was employed for biogenic volatile organic compounds (BVOC) determination. The analytical parameters (detection limit, quantification limit, precision and accuracy) which characterized the method will be presented. The Kovacs Indexes were calculated for 21 different terpenes and their values are in the concordance with the literature data.
The method was used for GC MS determination of different terpenoids emitted by the stress plants.

Silver birch (*Betula verrucosa*), one of the dominant species in Romanian forest, was tested for drought stress. In this case we used a Solid-phase microextraction (SPME) technique for trapping of the BVOC followed by GC-MS desorption.

CHEMISTRY AND APPLICATION FIELDS

- ENVIRONMENTAL PROTECTION-

OE1. **RESEARCHES CONCERNING GRANULOMETRIC COMPOSITION OF THE SOIL IN ARAD AREA**

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The research was carried out on a ground placed under the waste landing platform located in Câmpul Liniştii Street from the town of Arad, referring to its physical characteristics and their influence on groundwater pollution level. In this respect there were made four drillings at different depths, in the four cardinal points to groundwater level and the granulometric composition of the soil profile was established.

The determination of particle size fractions was made according to Kacinski`s methode, and the texture assessement was performed by using the soil textural triangle (C.D. Chiriţă, 1974 and the I.C.P.A. Methodology Bucharest, 1987). These drillings were cased with tubes made of polyvinyl chloride (PVC) having a diameter of 110 mm.

From the results obtained at the four drillings performed, we may distinguish the existence of layers with different textures, prevailing the clay - loamy ones.

OE2. BIOFERTILIZERS - A CHEAP AND SAFE ALTERNATIVE TO CHEMICAL FERTILIZERS IN FARMING PRACTICE

Lucian Hălmăgean, Virgil Ciutină, Maria Mihaela Balint, Daniela Diaconescu

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Agricultural production is threatened by declining productivity of agricultural land as a result of unconventional practices of land use and water and constant release of chemical products more and more toxic to humans and animals. One way to remove this danger is to use in organic farming the biofertilizers, a safe and cheap alternative to conventional chemical fertilizers. This method is described by including in the agricultural microbiocenoses the populations of symbiotic nitrogen fixers and / or associations of the genus Rhizobium, for which was demonstrated a rate of atmospheric nitrogen fixation by up to 70% of nitrogen. To this purpose, in Arad agri-environmental area, we tested several biofertilizers produced in the country (Biotrofin, Ecofertil B Azotofertil) at legume crops and their management.

OE3. STIMULATING THE MORPHO-PRODUCTIVE CHARACTERISTICS AT MOMORDICA CHARANTIA L. UNDER THE INFLUENCE OF BIOSTIMULATORS ACCEPTED BY ORGANIC FARMING

Maria Mihaela Balint, Virgil Ciutina, Lucian Hălmăgean, Monica Zdremţan

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Momordica charantia L. or bitter cucumber is grown in tropical areas being particularly valuable in strong anti-diabetic hypoglycaemic action. In Arad agri-environmental area was cultivated on unprotected field since 2002. During this period I studied and published results on technology culture of this species, referring directly related to optimal densities, how to establish culture, support system, regime fertilization.

To stimulate morpho-productive characters at bitter cucumber in the last two years, we studied the influence of biostimulators accepted by organic farming.

Organic products tested with the role in inducing and promoting growth and fruit development and quality by adjusting their dry matter content, sugars, proteins, minerals and vitamins are Atonik, Revital, Procaine, Raykat, Razormin, Floron and Nemagold. Recommended results in their production.

OE4. THE USE OF FERROMONAL BAIT IN THE SUPERVISION OF THE LOBESIA BOTRANA POPULATION (DEN ET SCHIFF)

Teodor Podrumar, Lucian Hălmăgean, Monica Zdremţan

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The pheromone baits have been used at SCDVV Miniş during 2001-2003 in the action of discovering and determination of the spreading zones of the grape moth, for the supervision of the evolution and dynamics of their populations, and also for settling the opportunity for the treatment applications.

Lobesia botrana (the grape moth) is the main pest which is present in the viticultural plantations of the Miniş-Măderat vinegrowing region.

Feromonal traps and baits have been layed in the viticultural plantations and captures have been taken three times a week. Flight curves have been settled that helped with the treatment application decision.

This used procedure, avoids both the useless costs and also the environment and wine polution.

OE5. GREEN FERTILIZERS – FIXING NITROGEN PLANTS, THE ENERGY REQUIRED FOR MICROORGANISMS IN VINEYARD SOIL

Lucian Hălmăgean, Teodor Pordumar, Radu Tetulea, Sabin Chis

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Researches at Minis in 2010-2011 allowed us to obtain information using green fertilizers, fixing nitrogen plants for vine fertilization and production of quality grapes for red wine (Merlot variety).
Knowing that the soil on which the Merlot is located is poorly supplied in nutrients regosol, this fertilization contributes greatly to the application of technologies to protect the environment, promoting sustainable viticulture principles.

OE6. PREVENT AND REDUCE THE DAMAGE CAUSED BY PHYLLOXERA THROUGH A TECHNOLOGY MANAGEMENT RESPECTFUL TOWARDS THE ENVIRONMENT

Teodor Pordumar[1,2], Virgil Ciutina[2], Radu Tetulea[1]

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The purpose of this paper is to maintain the healthy of vineyards using environmentally friendly methods.

For this, in 2008, they chose two varieties, Cabernet sauvignon and Mustoasă de Măderat, setting up a plantation of cuttings by rooting own. On these varieties were used treatments of Beauveria sp. using two variable factors to combat ecological phylloxera. Factor A - organic fertilizer, factor B - bio doses.

PE1. REUSE OF WASTE WATERS FROM TEXTILE INDUSTRY

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Most of the processes from the textile industry are based on chemical reactions that occur in heterogeneous systems, thus resulting wastewaters with a variable composition, which are an environmental risk of major importance. The impact of the textile industry on the environment is mainly due to the large amount of water used and sewage overflow. Therefore the reuse of these resulted wastewaters is of great importance, using methods which are economically feasible.

PE2. THE USE OF BIOSENSORS FOR DETERMINING A PHENOLIC POLLUTANT FROM WASTEWATERS

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The compounds which are present in the wastewaters from textile industry show a high toxicity for organisms, which is why in Europe their presence is not permitted in a total concentration greater than 0.5 g / L. This study is considering the use of an amperometric biosensor based on lacasse for monitoring the phenolic pollutants which are present in the wastewaters from the textile industry.

PE3. FT-IR STUDY OF RAPE SEED OIL TRANSESTERIFICATION REACTION IN ORDER TO OBTAIN BIODIESEL

Dorina Rodica Chambre, Gabriel Leucuta

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The transesterification reaction of rapeseed oil in alkaline catalyst was studied using the FT-IR method. Specific area of the pick for biodiesel was evaluated.
The reaction was performed "Banch" or ultrasonic field conditions and the conversion degree was determinate in both conditions. In ultrasonic presence the conversion was around 50% in the first 10 minutes from the initial moment of the reaction. In Banch method, the same conversion degree was obtained after 40 minutes.

PE4. SUPPORT SUSTAINABLE DEVELOPMENT AT LOCAL LEVEL, BY CONSUMING ORGANIC AND ECO-LABELED PRODUCTS

Eugenia Ţigan

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Sustainable development can be considered a new concept, but is nothing but a redefinition of ancient ethical concept, showing on the one hand, people who are current relations with the environment, and on the other hand shows that responsibilities current generation to future generations.

For a community to be sustainable, it is necessary to adopt a comprehensive approach, thus taking into account both economic resources, those of the environment and also at the same time and socio-cultural resources. In this sense becomes extremely important the consumption behavior of the local community, especially the percentage of biological and eco-labeled products consumed locally, these are products that promote sustainable development.

PE5. RESOURCE EFFICIENCY UTILISATION, SUSTAINABILITY OF PRODUCTION AND CONSUME

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European policies have begun to address the challenges of unsustainable consumption patterns only recently and are focused on approaches to life products, promote green procurement and initiate some action oriented consumer behaviour.

Changes in the pattern of consumption were registered along the latest years, some very favourable and some of then quite unfavourable. A decoupling system between energy consumption and recourse utilisation is strongly recommended and specific actions should be taken. On the other hand waste reutilisation and recycling became a common practice, increased resource utilisation but is not determining a strong impact upon the environment. Resource consume determined at population level decreased due to economic problems and not because there is a change in consume patterns. Sustainable production and consumption is a collective change and is demanding all actors to take part is a responsible way.

CHEMISTRY AND APPLICATION FIELDS

-FOOD ENGINEERING-

OF1. OBTAINING AND CHARACTERIZATION OF FLAX SEED LIGNANS

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Flax seeds have been used traditionally as functional food in many parts of the world. Recently functional properties of flax seeds are given considerable attention worldwide.

The diglucozid secoisolariciresiol lignan (SDG) is widespread in the vegetal kingdom but flax seeds represent by far the richest food source (they contain 800 times more lignans than any other plant). A number of studies have shown that lignans from flax seeds, including SDG and aglycones or secoisolariciresinol (SECO) have many actions beneficial to the human health: reduce the growth of tumors, decrease the cholesterol levels, prevent the development of diabetes type I and II (71%), they act as hypotensive agents (without influencing the pulse) and they are anticarcinogenic fighting against breast, prostate and colon cancers. The aim of this study was the development and optimization of an extraction technology and method of lignans analysis for the flax seeds extracts.

OF2. VALORISING LINSEED, HEMP AND RAPESEED EXTRACTS THROUGH FUNCTIONAL FOOD

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Recent marketing studies show an enhanced demand for functional food product, which used on a regular base contribute to maintaining an optimum health, through macronutrients, micronutrients and biologically active compounds (antioxidants, vitamins, soluble and insoluble fibres).

Flax and hemp, especially their seed, are rich sources of valuable fatty acids, amino-acids, phytoestrogens, cyclolinopeptides, lecithin, waxes, lignin, pectin, mucilage and other biologically active compounds. These plants are one of the most abundant plant sources of polyunsaturated fatty acids (PUFA) from ω-3 and ω-6 family, which are effective for prevention of cardiovascular and heart diseases.

Hemp and flaxseed oils have a healthy balance of fatty acids being low in saturated fatty acids and excellent sources of both n-6 and n-3 fatty acids, free from trans fatty acids.

Moreover, lignans found in flaxseed, class of phytoestrogens which have a potential beneficial impact on the treatment of several hormone dependent diseases in humans, have been extensively investigated for their potential anticancer, antibacterial and antioxidant properties. It has a beneficial effect on both types of diabetes, some hormone dependent diseases and is vital for proper functioning of nervous system.

Flaxseeds mucilage is recommended for using as covering substances in the treatment of gastrointestinal tract, throat diseases and skin diseases where it's protective, laxative and emollient properties are utilized.

The composition of essential amino-acids, unsaturated fatty acids and mucilage of flax and hemp seeds positively affect growth and glossiness of hair and nails. They are valuable ingredients of many kinds of cosmetics, pharmaceuticals and functional foods.

OF3. ASCORBIC ACID STABILITY IN VACUUM IMPREGNATED APPLE

Claudiu Ursachi, Sabin Chiş, Ioan Calinovici

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Vacuum impregnation is considered as a useful technique to quickly introduce external liquids in the porous structures of plant tissues, in a controlled way. As consequence some mass transfer processes are improved and also some changes in food composition may be produced.

The aim of this paper is to use vacuum impregnation in order to introduce ascorbic acid into the structure of apples, so that the products become strengthened with vitamins and follow the vitamin's stability during the storage of apples in terms of refrigeration and defrosting. We also took into account the need to prevent the sliced apples to turn brown during this process, knowing their sensitivity towards oxidative factors on the one hand and the antioxidant properties of ascorbic acid on the other hand.

OF4. DEXTRAN PRODUCTION FROM LACTIC FERMENTATION OF WATERMELON

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In the present study, the economic production of dextran using local and cheap sources of carbohydrate and nitrogen was investigated. Using pure components for the fermentation medium in dextran production imposes high costs on the industry.

In order to produce dextran, the lactobacreium *Leuconostoc mesenteroides* was used.

The bacterial culture was isolated form the fermented watermelon brine, preveously obtained. The samples were inocluated on culture media and incubated.

Different concentrations of watermelon juice were used and dextran was obtained by precipitating it several times with cold ethanol and the precipitate was dried in a desiccator. After all these procedures, dextran powder was obtained.

PF1. CHARACTERISATION OF α-AMYLASE EXTRACT FROM MALT

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The malt α-amylase extract has been obtained through an aqueous simple extraction, using malt from a barley cultivar Daciana provided by SCDA Turda. The effect of the pH and temperature upon the catalytic activity of this enzymatic extract has been studied in this paper. Knowing the optimum functioning parameters is essential in order to apply the enzymatic extract in industrial processes. There are several methods for assessing the activity of the amylase, so, the purpose for which the enzymatic extract is dedicated will dictate the choice of the method. To characterise the catalytic activity of the alpha-amylase extract, the iodometric method has been used to evaluate the amount of hydrolysed starch (substrate) during enzymatic reaction in comparison to pure alpha-amylase acting on the same substrate in the same condition.

PF2. EXTRACTION AND CHARACTERIZATION OF FLAX SEED LIGNANS

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The aim of this study is the development of effective methods for the extraction and separation of natural bioactive compounds from flax seeds, having as a goal the encapsulation of these compounds in natural polymers. For the isolation, identification and characterization of the lignans, different extracts (ethanol. acetone, NaOH, HCl) in various conditions (temperature, time, exposure to ultrasound) were made, in order to perform a comparative study regarding the effectiveness of the methods and solvents which were used.

PF3. EMBEDDING ACTIVE PRINCIPLES FROM FLAX SEEDS EXTRACT IN XANTHAN-CHITOSAN MATRIX

Ionel Marcel Popa, Ioana Ignat, Andreea Pag, Cecilia Sîrghie

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Polyelectrolyte hydrogels formed by Xa and Cs can be used for the encapsulation and controlled release of therapeutic agents, enzymes, various active ingredients for dietary supplements, etc. The complexing reaction between the two poly-ions leads to structural changes in both the structure of Xa and Cs. A water-insoluble hydrogel is formed, by reaction of anion R-COO-groups from Xa and cationic groups R-NH_3^+ from Cs. These interactions create a network capable of immobilizing active principles. Depending on the field of use, hydrogen can be prepared as microspheres, films, particles, tablets and pads.

Aim of the work: The obtaining of controlled release systems for flax seeds extract by embedding/encapsulation in polymeric supports based on natural biocompatible and biodegradable polymers that can be used as food supplements.

PF4. OBTAINED RESULTS FOR *PISUM SATIVUM* CULTURE FERTILISATION IN ORDER TO IMPROVE SOME MORPHO-PHYSIOLOGICAL AND PRODUCTION PARAMETERS IN ARAD VEGETABLE AREA

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The physical factors that can influence, negative or positive, the morpho-physiological and production characteristics for pea cultures are referring mostly to light, temperature humidity and pH. Pea, being a long day plant, needs at least 8 hours/day light period, otherwise the blooming will not take place. The said physical factors had been watched and recorded for an experimental parcel that has 18 plots, with 6 variants and 3 repetitions. Soil reaction and temperature, recorded at sowing are favorable and ensures the growths of vegetative mass with direct implications on some morpho-physiological and production indices for garden pea.

PF5. RESEARCH REGARDING THE USE OF STARTER CULTURES IN VEGETABLE PICKLES INDUSTRY

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In this paper there was carried out research regarding the use of starter cultures for lactic fermentation initiation in the case of mixed vegetable salad. For this, there were isolated 4 types of lactic bacteria responsible with the initiation and propagation of this process. The lactobacteria were obtained through extraction from a brine solution of an already fermented salad.

After the bacterial isolation, there were prepared 8 samples: each containing one of the folowing: *Pediococcus cerevisiae, Leuconostoc mesenteroides, Enterococcus faecalis* or *Lactobacillus plantarum.*. The results showed that the presence of starter cultures in vegetables pickling could be beneficial through the acceleration of the fermentation, but, in some cases the organoleptic qualities of the final product could be inferior.

PF6. TESTING THE ANTIOXIDANT EFFECT OF SOME PLANT EXTRACTS ON LIPIDS

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Taking into account that antioxidants play a decisive role in protecting food products oxidation subjected, present paper presents the testing of the antioxidant effect of some plant extracts on a mixture of fatty acids. For this study five plants were chosen and studied separately and combinated in different proportions: bilberry leaf (*Myrtili folium*), sage leaves (*Salvie herba*), walnut leaves (*Juglandis folium*), burdock root (*Bardanae radix*) and nettle (*Urticae herba*). Characterization of unsaturated fatty acids was achieved by applying infrared spectroscopy in the 4000-400 cm^{-1} domain. Testing the antioxidant effect of plant extracts on lipids was performed in the 60-150^{o}C domain, the IP values of the mixture of fatty acids with plant extract being calculated after 24 hours. Using the plant mixture did not lead to changes after heat treatment, which proves that the IP does not increase significantly and the extract provides necessary protection for a certain period of time.

PF7. THE EVOLUTION OF WINE QUALITY DURING TECHNOLOGICAL PROCESS AT SUPERIORS WINES FROM MINIŞ VINEYARD

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Placed in the West part of the country, Miniş vineyard is one of the oldest Romanian vineyards, documentary attested from XIth century. It reaches its fame along time through red wines of high class, known in the European countries and all over the world: Cadarcă, Merlot, Burgund, Cabernet Sauvignon, Pinot Noir, but also for the white wines: Riesling Italian, Fetească Regală and Mustoasa de Măderat.

The determinations that were done in this study regarded the evolution of physicochemical characteristics during the technological process, maturation and obsolescence, with addition of different sulphur dioxide concentration and with enzymatic mixtures. We also study the evolution of phenolic compounds during the technological process that took place in rotating metallic tank for the superior red wines.