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PLENARY LECTURE

NEW FIBRIN-POLYMER INTERPENETRATING NETWORKS: A POTENTIAL SUPPORT FOR HUMAN SKIN CONSTRUCT

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Interpenetrating polymer network (IPN) architectures have been conceived to improve the mechanical properties of a fibrin gel. Self-supported biomaterials are synthesized rapidly (one pot – one shot process) and combine the properties of both a protein gel and a synthetic polymer. IPN architectures have been characterized with biochemical (ELISA), chemical (solvent extraction) and physicochemical (rheology, DMA) methods. Mechanical properties of a fibrin gel were improved (viscoelasticity x 100) by associating it with a polymer network (PEO, PVA) inside IPN architecture. The network composition insures the material biodegradability through enzyme hydrolysis. These co-network IPNs are the first ones to be potentially biodegradable through tunable fragmentation, then elimination. They also exhibit the unique feature for a protein-based biomaterial of being non-retractable when used as support for fibroblast culture. The material is biocompatible as demonstrated with human dermal fibroblasts. Adhesion, viability and proliferation of human dermal fibroblasts have been measured for various IPN compositions with Live/dead test and by confocal microscopy. This innovative biomaterials present good potentiality as supports for skin construct.

Keywords: IPN, tissue engineering, biodegradability

I.
MATERIALS

INFLUENCE OF PARTICLE SIZE AND PHASE DISTRIBUTION ON ADHESION OF ADHESIVE DISPERSIONS BASED ON POLYCHLOROPRENE GRAFTED WITH MMA

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Besides optimum rheological properties and adhesion, adhesives must meet other conditions: not toxic, flammable and does not pollute the environment. Classical adhesives based on volatile organic compounds; do not fully meet these requirements, for which aqueous dispersion adhesives environment have become increasingly used, tending to replace almost completely organic solvent-based adhesives. Through grafting operation of elastomeric chains with methyl methacrylate, of dispersion of their solution in the aqueous environment and the use in the composition of the sodium montmorillonite, was obtained adhesive "water-based" with the characteristics of high initial and final adhesion, comparable with the organic solvents, and low toxicity or even absent. Particle size provides important information on the optical properties, stability, and viscosity of the system. At the same time, can elucidate the kinetic aspects of both during the emulsion the synthesis when obtain composite materials. Particle size distribution of adhesives solutions was determined with equipment Mastersizer 2000 (Malvern Instruments, UK) laser light, the range from 0.02 to 2000 mm, with precision of ± 1%. By measuring the particle size and phase distribution on micron-scale or nanometer, it has been shown that the smaller the particles the better penetrate porous media substrates, and on the other hand, the dispersions can have a high dry matter content, which may lead to an optimum combination of rough media. This class represents the most innovative volatile organic replacement based adhesives products.

Keywords: adhesive dispersions, particle size, phase distribution.

INFLUENCE OF SILICA MICRO-PARTICLES LOADING ON THE FLEXURAL PROPERTIES OF DENTAL RESIN COMPOSITES

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The objective of this study was to evaluate the influence of silica (SiO_2) micro-particles loading on the flexural properties of dental resin composites (DRCs). The DRCs were prepared from a resin matrix comprising Bis-phenol A-glycidyl methacrylate (Bis-GMA) as a base monomer and triethylene glycol dimethacrylate (TEGDMA) as a diluent monomer mixed with SiO_2 micro-particles as a reinforcement filler in a ratio of 40, 50 and 60 wt%. The samples were then light-cured using a LED TPC 60. The density (g/cm^3) of the DRC samples was determined according to the ASTM D792-98 standard. The values of flexural strength (FS) and flexural modulus (FM) were determined using the three-point bending test according to the ISO 4049:2009 standard. The results revealed that the density values of the DRCs increased as the SiO_2 loading increased. The FS values decreased as the loading of the SiO_2 increased from 84.52 to 53.2 MPa. In contrast, the FM values increased as the SiO_2 loading was increased from 1.55 to 7.51 GPa. There were significant differences ($p<0.05$) in the values of FS and FM when the composites contained different amounts of SiO_2 micro-particles. The SiO_2 micro-particles used for reinforcement of the resin matrix had an effect on the flexural properties of the DRCs.

Keywords: Flexural properties, Silica, Dental resin composites

STUDY REGARDING THE RESISTANCE OF WET-WHITE LEATHER TANNED WITH TITANIUM – ALUMINUM TO THE GROWTH OF FUNGI

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In the tanning industry the problem of micro-organisms able to grow on leather during the different processing phases is well known. Wet-white leathers are excellent substrates for fungal growth: storage temperature, acid pH, presence of water, proteins and fats constitute the most important conditions for the development and growth of a lot of moulds such as *Penicillium* spp, *Aspergillus* spp. and *Trichoderma viride*. The fungal contamination appears as coloured stains on the leather, usually permanent. Microbiological testing has been performed on wet-white leather tanned with Ti-Al based tanning agent using an inoculum with 4 species of fungi. This study revealed that the Ti-Al-tanned wet-white leather is attacked by all types of fungi studied.

Keywords: wet white leather, microbiological analysis, Ti-Al tanning agent

STUDY REGARDING THE RESISTANCE OF ORGANIC TANNED WET-WHITE LEATHER TO THE GROWTH OF FUNGI

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The paper presents the resistance of wet-white leather organic tanned with oxazolidine and resorcinol to the growth of fungi. Wet-white leather was characterized for microbiological resistance using an inoculum with 4 species of fungi: ATCC 6275 of *Aspergillus niger*, *Trichoderma viride*, *Aspergillus oryzae* 153 and *Mucor pusillus.* Wet-white leather samples tanned with resorcinol-oxazolidine are attacked by *Aspergillus niger* and *Mucor pusillus*, but inhibit growth of moulds from *Aspergillus oryzae* and *Trichoderma viride* species. This type of leather can also be damaged by mould from the *Penicillium* genus.

Keywords: organic tanned wet white leather, microbiological testing, fungi

CHARACTERIZATION OF THE STATE PLANAR ORIENTATION FOR SHORT NATURAL FIBER IN POLYMERIC COMPOSITES BY MEANS OF THE TENSOR ORIENTATION

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This investigation presents a detailed description to evaluate and predict the orientation state of short fibers of "Guadua Angustifolia Kunth" (GAK) as reinforcement in polypropylene (PP) matrix by using the second order orientation tensor. For this, several samples were prepared by injection molding and then metallographically polished. The aim of this work is to predict the state planar orientation for short natural fibers as an initial stage to determine the mechanical behavior of composite materials. The tensor orientation is determined by using digital image processing in selected polished sections of different material samples. For both digital images processing and computational modeling it was possible to find different orientation states over all specimens. This method will allow us to know the real effect of the flow fibers on the main mechanical properties of the biocomposites.

Keywords: Orientation tensor, polymeric composites, image processing.

A NEW NATURAL FIBER: TOQUILLLA STRAW A POTENTIAL REINFORCEMENT IN THERMOPLASTIC POLYMER COMPOSITES

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Toquilla straw (*Carludovica palmata*) obtained from the Manabí province in Ecuador has been used traditionally for weaving the Panama hat. Due to its importance and high disposability as a renewable source and the methodological characterization which is required to understand its physical and chemical properties. To this end, sections of treated and untreated specimens were studied to analyze the mechanical, thermal, spectral and morphological properties. From thermal and mechanical analysis's that were carried out on the Toquilla straw fibers revealed a temperature onset of about 230°C before the degradation and Young's modulus as well as stress in the range of natural fibers used as reinforcement in thermoplastic polymer composites. Possible changes in their composition and structure were monitored using Fourier Transform Infrared spectroscopy as well as the morphology by means of a scanning electron microscope.

Keywords: natural fibers, reinforcement polymer composites, mechanical properties

HYBRID PE/PA/NANOPARTICLE COMPOSITES RESISTANT TO HIGH TEMPERATURES

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In the field of polymeric materials, leading companies turned to the development of modified polymers with superior physical and mechanical properties compared to those of the basic constituents, individually considered, which offers a degree of versatility that was not obtained with any other material. Composite materials are produced with anisotropic properties both at the nano, micro- and macroscopic scale, formed by the assembly of several components whose organization and design allow use of the maximum specific properties of each component in order to obtain higher overall final properties of each component. The most common composites are polymeric, in which the combination of plastomers with batches, nanoparticles and other ingredients lead to a significant variety of materials with much improved properties compared to the original and even directed towards predetermined properties according to the market requirements. This paper shows resistant polymeric nanocomposites (TEO) based on compatibilized polyethylene (PE) and polyamide (PA), with advanced characteristics based on reinforcement materials in the form of powders with nano structure and chemically activated surface, that provides qualitative performance and meeting the current requirements of quality and aesthetics for consumer goods.

Keywords: polymers, hybrid composites, thermal resistance

DETERMINATION OF SKIN PROPERTIES IN DIFFERENT TYPE, GENDER AND AGE USED FOR RIPENING OF CHEESE

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In traditional Tulum cheese production, sheep and goat skin sacks are commonly used. The realization of ripening process in Tulum cheese affects significantly the quality of the cheese. Considering the differences in casing materials, the ripening process, consequently the properties of the Tulum cheese are affected. In the present study, raw skin properties in different type, age and gender were investigated. Physical, chemical and structural characteristics of goat and sheep skins, which have different age (6 month, 1 and 2 years old) and gender (male and female), were determined according to thickness, tensile strength and elongation at break, tear strength, water vapour permeability, air permeability tests and, analyses such as pH, matters soluble in dichloromethane, shrinkage temperature and, Total KjeldahlNitrogen. For this purpose, 5 dry salted skins from each type, totally 60 skins were used. It was revealed that a big difference between the skin characteristics was determined depending on type of skins, ages, and genders used for ripening process. It is believed that the findings will lead to new technological advancements to create new casing production materials.

Keywords: Tulum cheese, goat skin, sheep skin

NANOMATERIALS FOR LEATHER SURFACE FUNCTIONALISATION

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Nanomaterials are an innovative research direction for the leather and footwear industry due to their high potential of replacing potentially toxic volatile organic materials and their ability to develop smart properties. The paper presents three directions for preparing nanomaterials with advanced properties compared to existing commercial products based on nano titanium dioxide (TiO_2) and nano zinc oxide (ZnO): electrochemical, hydrothermal and thermal synthesis. Nanomaterial performance was improved by

doping and co-doping nano titanium dioxide in order to broaden the photoactivity range or increase the share of nanomaterials known for their thermal resistance properties. Characterization of these materials by specific techniques that highlight the crystalline structure (X-ray diffraction), particle size (DLS), absorption ability in UV-Vis (DRS), photodegradation ability of organic pollutant models (Vis spectroscopy) and thermal analysis (DSC) proves the performance of the new nanomaterials. By applying innovative technologies for leather finishing with composite polymers containing photocatalysts based on TiO_2/ZnO nanoparticles doped with metals/non-metals on can obtain leather products with advanced surface properties. The properties that these nanomaterials can transfer to leather surface are: self-cleaning, thermal resistance, biocide resistance, degradation of volatile substances, odorous substances etc.

Keywords: nanomaterials, photocatalysts, self-cleaning leather

PREPARATION AND APPLICATION OF SODIUM SILICATE COMPOUND SWELLING AGENT

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Low modulus sodium silicate was prepared with a polysilicon byproduct-silicon tetrachloride, and used as a swelling agent. Calcium chloride, hydrazine and protease were selected successfully as auxiliaries. Then dosages of the auxiliaries were optimized through the relative weight increase, relative thickness increase, proteoglycan removing and histology study. Based on the auxiliary optimization experiment, a compound swelling agent was prepared and the swelling ability was investigated with a scanning electron microscope and proteoglycan removing test. Finally, the environmental impact of the swelling process was evaluated by total solid of the swelling effluent. The results showed that, when the swelling agent was consisted of 4.0% sodium silicate, 1.0% hydrazine and 0.2% protease, the relative weight increase, relative thickness increase and proteoglycan removing ability reached the highest value, meanwhile fibers were also fully opened. Compared with the traditional liming process, a less total solid value was presented in the swelling effluents. The results could provide a new way for silicon tetrachloride recycling, also provide valuable references for cleaner swelling process.

Keywords: swelling, sodium compound swelling agent, polysilicon

OFF-AXIS MECHANICAL PROPERTIES OF FRP COMPOSITES

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Composite structures made of fibre reinforced polymer (FRP) composites are usually built-up of several individual unidirectional laminas which may have their natural material axes at different orientations with respect to the loading direction. Off-axis mechanical properties of the unidirectional FRP lamina can be determined either experimentally or predicted theoretically. One way to theoretically predict the off-axis stiffness and strength properties of a unidirectional orthotropic lamina is by applying the macromechanical concepts. This paper presents the available macromechanical approaches utilized to calculate the off-axis stiffness and strength properties of a unidirectional orthotropic lamina for which the loading directions are different from the principal material axes. In addition, a case study is presented, in order to apply the macromechanical tools to a FRP lamina made of glass fibres and epoxy matrix.

Keywords: FRP composite lamina, off-axis strength properties, off-axis stiffness properties.

SYNTHESIS AND SWELLING PROPERTIES OF POLY[ACRYLAMIDE-*co*-ACRYLIC ACID] SUPERABSORBENTS OBTAINED BY ELECTRON BEAM IRRADIATION

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The aim of this study is to investigate the gel fraction, sol fraction, water absorbency and crosslink density of superabsorbents based on polyacrylamide/acrylic acid. Superabsorbents were prepared by free radical co-polymerization in aqueous solution of

acrylamide with acrylic acid and different concentration of initiator at room temperature (25°C). Samples were subjected to electron beam treatment with doses ranging between 3 and 4.5 kGy.

Keywords: copolymerization, acrylamide, acrylic acid, superabsorbent, electron beam.

NANOPARTICLES AND DEPOSITION METHOD FOR PHOTOCATALYTIC TEXTILES AND DURABLE WOOD

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This paper presents the research results obtained in ERA NET MANUCOAT project, coordinated by INCDTP in collaboration with the following partners: INCDMNR-IMNR, SC MGM STAR CONSTRUCT SRL –Romania and IRIS-Spain. Requirements for the textiles with multi-functional properties and durable wood are increasingly higher. New photocatalytic textiles with sensitivity in the visible spectrum, antibacterial and antifungal properties and wood with increased durability to environmental conditions were developed. To this aim, the obtaining of nanostructured undoped and Ag-doped TiO2 powders with characteristics that enable their deposition by physical methods and with an extended absorption in the visible region and establishment of the technological parameters for physical deposition technique represents the main issue. The innovative elements presented consist in the development of hydrothermal technology to obtain doped TiO2 NPs Anatase with extended absorption in the visible region and increase of the photo degradation rate and the manufacturing of new flexible, smooth nanostructured layers on textile and wood materials through improved physical method (plasma electro-spay, RF sputtering). The influence of different nanoparticles composition and coating methods of textile and wood is discussed through the main analyses and their results: contact angle, SEM/EDX, surface and volume resistivity, degradation rate of the methylene blue/methyl orange, antifungal and antibacterial effect, washing fastness.

Keywords: TiO_2 nanoparticles, sputtering method, photocatalytic textiles

NEW PIGMENT PASTE FOR LEATHER FINISHING

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Environmental problems that the leather industry faces today regarding leather finishing include restrictions on the use of heavy metals in pigment pastes, ethoxylated alkylphenols, formaldehyde and other toxic crosslinking agents. Environmental and toxicity related concerns have led to new alternatives for leather finishing auxiliaries. The quality of pigment pastes used, playing a major role in obtaining leather finishing film, influences some physical-mechanical, technological, aesthetic and ecological properties, which, cumulated, confer value of use and commercial appearance to various leather items: footwear, garments, bags and upholstery. This paper presents a study on the physical-chemical characterization and ATR-FTIR spectroscopy of a new pigment paste and leather finishing composition made using the new pigment paste, acrylic binder and biodegradable non-ionogenic emulsifier (which replaces nonylphenol ethoxylate). The finishing film obtained using the new finishing composition shows higher thermal stability compared to those currently used, as evidenced by differential thermal analysis (DTA).

Keywords: leather, finishing, pigment paste

POLYMERIC NANOSTRUCTURES BASED ON POLYOLEFINS AND RUBBER FOR THE FOOTWEAR INDUSTRY

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Designing and constructing materials of technical and engineering interest with preset physical-chemical and mechanical properties have commanded the attention of researchers and engineers since the beginning of the technological era. Polymeric nanostructures based on rubber and plastics were identified as the best method to produce new polymeric materials able to satisfy complex performance requirements. Over the last few years, the global tendency to develop new advanced hybrid polymeric materials from a mixture of polymers (elastomers and plastomers: EPDM with thermoplastic polyolefins) and reinforcement agents with nano-sized particle has given new possibilities of extending their area of application. Nanostructures based on thermoplastic polymeric compounds – EPDM/polyolefins/nanoparticles – were selected because one polymer alone cannot meet all requirements regarding mechanical, physical and chemical properties. Thus, we combined characteristics of the two polymers, such as chemical resistance; low water permeability; resistance to high temperatures, ozone and radiation; flexibility at low temperatures; colour stability; processability properties adapted to the injection technology; green and waste-free technology; reduced working time; low energy consumption for processing into finished products; recirculation of material in approximately five cycles without changing its properties etc. Performance of polymeric nanostructures depends on the concentration and morphology of the elastomer and plastomer used, processing parameters, type and concentration of auxiliary materials used in compounding, the equipment and working parameters used in compounding, etc.

Keywords: polymeric nanostructures, EPDM, polyolefins, nanoparticles.

THE EFFECT OF FILLER ON CHARACTERISTICS OF SOME ETHYLENE VINYL ACETATE COPOLYMER COMPOSITES

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In this research work, the influence of the amount and type of filler on characteristics of some ethylene vinyl acetate copolymer (EVA) composites was studied. Materials used in the study were: ethylene vinyl acetate copolymers Elvax 260 (27.8% wt% vinyl acetate content), four types of filler (precipitated silica Ultrasil VN3, carbon black HAF, precipitated kaolin and precipitated chalk) and other ingredients (zinc oxide, acid stearic, polyethylene glycol, antioxidant, dibenzoyl peroxide Perkadox 14-40B, polyfunctional monomer). The blends were prepared by means of blending technique, on an electrically heated laboratory roller mill at 70±5°C, friction 1:1.1 and total blending time 6-14'. Samples were crosslinked using two methods: by classic method in the presence of peroxides and by electron beam irradiation. The minimum torque and maximum torque increased with increasing filler content, and the highest values were obtained for the mixtures containing precipitated silica. Increasing the filler content tended to increase the hardness, 100% modulus, tear strength and tensile strength of the composites. The best results were obtained by adding active fillers - precipitated silica and carbon black - to samples crosslinked with peroxides, as well as by electron beam irradiation.

Keywords: ethylene vinyl acetate copolymer, filler, accelerated electrons, physical-mechanical characteristics, curing characteristics

FLEXYBRICK – REVOLUTIONARY SOLUTION FOR POLYURETHANE APPLICATION

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Polyurethane has been used in thousands of application all around the globe in different fields. From boots to skateboards, furniture, thermoinsulation and even mobile phones, polyurethane is an indispensable material today. Even though in the construction field its applicability has been widely increased, the paper proposes an innovative application for this material. The considered material is an eco-friendly one with low self weight and reduced needed labor. Detailed analysis are done between curent used solutions – masonry, light weight concrete, wood and the innovative solution called FlexyBrick. FlexyBrick is a new product based on polyurethane. The following parameters are analyzed: thermal rezistance, self weight, compression strength, bending strength and price. FlexyBrick is reinforced with recycled or organic materials in order to reduce costs (crashed glass, sand, cigarettes filters, straw, chopped rubber) and to improve mechanical properties. Using this new infill material the heating costs will be reduced and the execution time will decrease. The polyurethane bricks are easily adapted to any climatic condition and allow the water vapor transfer from the inside to the exterior side of the masonry, preventing condensation.

Keywords: infill, eco-friendly material, polyurethane.

INFLUENCE OF COUPLING AGENTS ON THE POLYMERIC MATERIAL / DISPERSE MATERIAL INTERFACE

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This paper presents the method of obtaining and the characterization of polypropylene-based composites reinforced with glass fibers and treated with coupling agents based on polydimethylsiloxane (PDMS), in the presence of a coupling agent such as polypropylene grafted with maleic anhydride (PP-g-MA), processed using a twin screw extruder granulator. The influence of coupling agents plays an important role in adhesion to the interface and in determining the properties of the composite. A major disadvantage of polypropylene matrix is given by the lack of functional groups, while the introduction of treated glass fibers results in composites similar to those obtained in the presence of conventional reinforcing agents (talcum, calcium carbonate, etc.). In this regard, adding 3% PP-g-MA in the polypropylene matrix under the influence of temperature and shear forces developed within the processing machine (extruder) results in opening the maleic ring, and the resulting carboxylic groups react with functional groups present on the surface of reinforcing materials, improving dispersion and interfacial adhesion. The materials used, both glass fibers and the resulting composite, were characterized physico-chemically, morphologically by SEM, and structurally by XRD, FTIR, etc. The results demonstrate good compatibility between phases in the presence of a coupling agent and of treated glass fibers compared with samples obtained in the absence thereof.

Keywords: composite, coupling agent, glass fibres

MECHANICAL BEHAVIOR OF A THIN LAYER GLASS FIBER STRENGTHENED OLD MASONRY

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Brick masonry structural system is commonly used in Romania and not only. This is due to its many advantages in terms of mechanical behavior based on increased capacity of stress redistribution. In case of seismic actions, many buildings have been partially damaged (in some cases more than 50%) leading to the investigation of appropriate strengthening solutions. In addition to traditional strengthening solutions, composite materials are an advantageous alternative due to the high strength versus weight ratio. This paper presents an experimental and numerical analysis on old brick masonry specimens made with weak lime mortar and limestone sand, subjected to uniaxial compression. The results were compared with finite element numerical analysis in order to show stress distribution between brickwork and strengthening layers applied. Several forms of strengthening application relative to masonry faces (interior and exterior) were considered in the numerical analysis. The beneficial effect on the

mechanical behavior of strengthened masonry in terms of stress and strain distribution of both masonry and strengthening layers is shown to be dependent on the thickness of the strengthening layer.

Keywords: masonry strengthening, glass fiber mineral composites, mechanical behavior

EXPERIMENTAL TESTS AND FINITE ELEMENT MODELLING OF GLASS FIBER REINFORCED MINERAL MATRIX COMPOSITES

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The actuality of composite materials and the mechanical potential provided to the structural systems for new construction and strengthening solutions have led to many research studies conducted with great interest. Polymer composite materials have been studied for over 50 years and have been successfully applied in many technologies. In case of building constructions mineral matrix composites have the advantage of high compatibility between strengthened structural element and composite material used. Also these solutions can be used to create new structural elements meeting the same exacting structural requirements as traditional construction systems. This paper presents the results of experimental tests performed on one story structural model laterally loaded after in order to obtain the failure mechanism and maximum strength capacity. The experimental results are compared with FEM numerical analysis. The conclusions show the influence of glass fiber reinforcement and stress distribution in these composite systems, experimentally observed and compared with the numerical analysis results.

Keywords: glass fiber mineral composites, tensile strengthening, experimental tests

PERFORMANCES OF A POLYSILICON BYPRODUCT-SILICON TETRACHLORIDE ON WET BLUE PREPARATION

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Sodium silicate was prepared with a polysilicon byproduct-silicon tetrachloride through hydrolyzation and alkalization. Meanwhile, a new process for wet blue preparation was carried out, including enzyme dehairing, sodium silicate swelling, pickling and semi-chrome tanning. Properties of the wet blue such as mechanical properties, thermal stability and surface color were tested following the standard method. Chrome distribution of the wet blue was investigated with a inductively coupled plasma (ICP). A scanning electron microscope (SEM) and a atomic force microscope (AFM) were also used to illustrate the histological features of the wet blue. Finally, environmental impact of both swelling and tanning process were studied through COD, chrome contention, total solids and turbidity test. The results showed that, the standard requirements for shoe upper leather were met by the wet blue while the dosage of chrome agent was 1.0% (half of the traditional chrome tanning method). Meanwhile, for the wet blue prepared with new method, lighter surface color was presented, less Cr(III) was detected and also equally distributed. More compact fiber bundles were shown on the SEM images. No obvious damages were detected in tropocollagen fiber structures through AFM analysis. Furthermore, compared with the traditional process, COD, total solids and turbidity data of both swelling and tanning effluent provided a lower value. The results could provide a feasible way for silicon tetrachloride recycling, also provide valuable references for clean production of leather industry.

Keywords: silicon tetrachloride; silicon-chrome combination tanning; leather

COMPLETE CHARACTERISITC CURVE OF CONCRETE AND RUBBERIZED CONCRETE

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The complete stress-strain curve, also known as characteristic curve, of brittle materials is difficult to get due to sudden failure of the testing sample shortly after the peak load. The need for a full stress-strain curve is of paramount importance especially since

all of today's FEA packages employ such information in their analysis. Concrete is by far the most widely used construction material worldwide. It is inherently brittle and its complete characteristic curve is, to some extent, not yet available. The paper presents the experimental results that led to obtaining all the data required for tracing a full stress-strain curve of traditional concrete. Furthermore, the information is compared to that obtained for rubberized concrete where fine aggregates were replaced by rubber crumbs resulted from tire recycling. The rubberized concrete exhibited a more ductile behavior after peak load but with a penalty on the ultimate strength. The higher the percentage of aggregate replacement, the more ductile the behavior but with smaller compressive strength. Additionally, a decrease in the slope of the linear elastic range of the stress-strain curve was observed. The experimentally obtained curves were compared with the theoretical ones from the existing scientific literature. It was concluded that even though a close match was found, there is room for improvement in the consideration of the post-peak behavior of concrete.

Keywords: stress-strain curve, rubberized concrete, post-peak behavior

ELASTIC PROPERTIES OF MINERAL MATRICES WITH HIGH CONTENT OF ENVIRONMENTALLY SUSTAINABLE BINDER

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Concrete made with hydraulic binders, the vast majority of which are based on Portland cement, is by far the most widely employed construction material worldwide in terms of volume. The biggest advantage of modern concrete is the possibility of including other industrial by-products into the mix. The use of waste materials becomes more and more attractive as an alternative in the construction industry mainly due to the increasing cost of raw materials and the continuous reduction of natural resources. The present paper brings its contribution to the investigation on the use of a new binder, the anhydrous calcium sulphate in its β anhydrite III' form, a new Cementitious material, as partial replacement of the ordinary Portland cement in concrete. The binder is obtained exclusively from industrial wastes and can be entirely recycled after its expiration date. Its influence on the elastic properties of mineral matrices, at various curing ages, is experimentally investigated. The results show a slight decrease in the values of the longitudinal modulus of elasticity and no change in Poisson's ratio. Given the fact that up to 40% of Portland cement was replaced by the environmentally sustainable binder, the obtained results recommend the new binder as a viable solution in replacing Portland cement in construction works.

Keywords: sustainable mineral binder, elastic properties, cement replacement.

THE APPLICATION OF A PHOSPHORUS-NITROGEN FLAME RETARDANT RETANNING AGENT

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In order to improve the fire resistant of leather to meet the condition of higher fire-safety requirement, a phosphorus-nitrogen flame retardant retanning agent (M-THPS-U for short) was synthesized. The vertical flame test, oxygen index test, smoke density, mechanical properties, thicken rate, and shrinkage temperature were used to evaluate the property of M-THPS-U, and the dosage of M-THPS-U was optimized at the same time. Furthermore, the hide powder acting with M-THPS-U was used to study the flame resistant effect in detail by thermogravimetry (TG). The results showed that the fire resistance of leather was improved obviously by using 5% of M-THPS-U. With the increase of M-THPS-U dosage, the mechanical properties were dropped, but the fire resistance, thicken rate, and shrinkage temperature were raised. The thermogravimetry results indicated that the fire retardant could promote the fire resistance of leather by accelerating leather fiber into char. In short, not only does M-THPS-U improve the fire resistance of leather, but it also has retanning and filling effects.

Keywords: leather, phosphorus-nitrogen flame retardant, retanning

II. BIOMATERIALS

SYNTHESIS AND CHARACTERISATION OF MICROCAPSULES BASED ON NATURAL BIOPOLYMERS AND LAUREL ESSENTIAL OIL

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The aim of this paper was to obtain and characterize some microcapsules based on natural polymers, collagen hydrolysate and sodium alginate and laurel essential oil. The composition of Laurel essential was determined by GC-MS. By varying different synthesis parameters, water-oil emulsion method was choosing for obtaining the liquid microcapsules. The microcapsules were dried by lyophilisation. Collagen hydrolysate and microcapsules based on polymers were characterized by FT-IR spectroscopy, optical and scanning electron microscopy and particle size.

Keywords: natural polymers, essential oil microcapsules, collagen hydrolysate, sodium alginate.

BIOCOMPATIBILITY - REVOLVING ISSUE FOR BIOMATERIALS IN CONTAMINATED FIELDS: NOVEL THERAPEUTIC SOLUTIONS FOR COMPLICATED INCISIONAL HERNIAS

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Incisional hernias occur in nearly 20% of all abdominal procedures. Emergency repair is challenging and has limited the use of prosthetics in the past, especially if the operating field is contaminated to a certain degree. On the other hand, primary repair of abdominal wall defects has a high recurrence rate, ranging between 10 and 50% because of intrinsic parietal tension and myocutaneous flap necrosis. Growing interest for minimally invasive surgery and reduced hospital stay when repairing abdominal wall defects has led to research and development in the field of prosthetics that can serve those aims. Biomaterials, such as collagen impregnated meshes, seem to offer new possibilities for prosthetic repair of complicated incisional hernias, emergency incisional hernia surgery and mesh placement in contaminated fields. The article presents a retrospective study on biocompatibility and late tissue reactions, determined for complicated incisional hernias. The study relies on a 5 years' experience (2009-2013), analyzing 195 emergency prosthetic repairs for complicated incisional hernias versus 195 repairs for uncomplicated incisional hernias. The assessment of postoperative complications for the study parameters showed no significant differences between the two groups. The results promoted the development of a protocol for parietal prosthetic repair using biomaterials (collagen impregnated meshes) in complicated incisional hernias (i.e. Altemeier class III surgical wounds).

Keywords: biomaterials, biocompatibility, complicated incisional hernias

RESEARCH ON OBTAINING NUTRITIONAL SUBSTRATES FROM PROTEIN BIOCOMPOSITES

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Organic biocomposites are a source of raw materials for agriculture, as their composition provides enough elements to improve physical-chemical properties of degraded soils and plant growth. Using biocomposites obtained from compounding collagen

hydrolysates from pelt waste with various biodegradable polymers stimulates enzymatic substances in the plant, favours development of the root system and increases germination capacity of seeds, favouring rootlet development. The paper presents the development of nutritional substrates with protein biocomposites from pelt waste by means of an experimental facility of manufacturing biodegradable nutritional substrates. The advantages of using these nutritional substrates derive from the fact that, in comparison with currently used plastic substrates, they are biodegradable.

Keywords: leather waste, biocomposites, nutritional substrate.

RHEOLOGICAL STUDY OF BIODEGRADABLE LUBRICATING GREASES

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In the recent years, the lubricating market is demanding new biodegradable products based on renewable resources as a consequence of progressively more strict environmental regulations. This work is focused on the rheological study of some dispersions, potentially applicable as biodegradable lubricating greases obtained by dispersing calcium soap in vegetable base oils. The calcium soap is obtained during the grease preparation by saponification reaction between stearic acid, CH_3-$(CH_2)_{16}$-COOH, and calcium hydroxide, $Ca(OH)_2$. The vegetable oils were olive, palm and corn oil. For this study 15 grease samples have been prepared and each of them was analyses at 20, 30, 40, 50 and 60^oC. The effects that concentration of calcium soap and temperature exert on the rheological properties of these greases were studied. The evolution of shear stress with shear rate was very similar to that found for traditional lubricating greases. The rheological curves indicate that the greases have non-Newtonian behaviors which are better described by the Bingham model. In general, the values of plastic viscosity increase with calcium soap concentrations and decrease with temperature.

Keywords: calcium soap, biodegradable greases, rheological properties

ANTIBACTERIAL ACTIVITY OF *GLYCYRRHIZIC ACID* AGAINST MULTI DRUG RESISTANT BACTERIA AND FUNGUS

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Glycyrrhizic acid (GA) is a kind of triterpene glycoside obtained from Liquorice (*Glycyrrhiza glabra*). The aim of this study was to search the antimicrobial activities of *Glycyrrhizic acid* against bacteria some drug resistant bacteria (*E.coli*, *A.baumanii* and *P.aeruginosa*) and fungus (*C.albicans*). To determine the non-cytotoxic concentration of GA, HEp-2 cell line was used. The cells were cultured in RPMI 1640 supplemented with 10% fetal calf serum 1% (w/v). Cells were incubated in a humidified atmosphere at 37 ºC in 5% CO_2. Antimicrobial activity of GA was screened by broth microdilution procedures and principles of the CLSI. Stock solutions of GA at the concentration of 1000 µg/ml were prepared in ethanol. GA concentration range used in the antimicrobial tests was 1.92; 3.8; 7.8; 15.6; 31.2; 62.5; 125; 250 and 500 µg/ml prepared for bacteria in Mueller-Hinton broth and for yeast in Saboraud Dextrose broth. Minimal inhibitory concentrations for GA were investigated against both standard bacterial strains; *E.coli* (ATCC 25922), *P.aeruginosa* (ATCC 27853), *A.baumanii* (ATCC 17978), and yeast-like fungus; *C.albicans* (ATCC 90028) and clinical isolates of multi drug resistant isolates. It was established that *glycyrrhizic acid* inhibited the growth of bacteria with MIC values ranging between 15.6 and 31.2 µg/ml and showed anti-yeast activity with MICs at 62.5 µg/ml. While the GA exhibited significant antibacterial activity against multidrug resistant Gram negative bacteria, it was found to be slightly less effective against *C.albicans* isolates. We think that GA may be new hope for the treatment of diseases caused by multidrug resistant bacterial isolates.

Keywords: *Glycyrrhizic acid*, resistant, bacteria, fungus.

ANTIBACTERIAL ACTIVITIES OF SELECTED MEDICINAL PLANTS AGAINST MRSA STRAINS ISOLATED FROM SURGICAL WOUND INFECTIONS

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Methicillin resistance in *Staphylococcus aureus* is one of the most important antibiotic resistance. In this study, we aimed to investigate the antibacterial activities of some medicinal plants *(Laurus nobilis, Salvia officinalis, Thymbra spicata)* against MRSA strains isolated from surgical wound infections. Firstly, non-cytotoxic concentrations were determined in cellculture. In order to determine the non-cytotoxic concentrations of essential oils, HEp-2 cell line was selected. Antimicrobial activity studies were carried out under the non-cytotoxic concentrations for cells. Mueller-Hinton broth was selected to test the bacterium strain. The inoculum density was 1x 10^6 cfu/ml. The essential oils of plants were dissolved in absolute ethanol. The ratio of essential oils in the test medium furnished the required concentration ranging from 1000-7.8 (7.8; 15.6; 31.2; 62.5; 125; 250, 500 and 1000) µg/ml. The plates were incubated at 37°C and visually read after 48 hours. The MIC values were recorded as the lowest concentrations of the substances that had no visible turbidity. The antibiotic susceptibilities of MRSA isolates were determined by microdilution method according to the CLSI (Clinical and Laboratory Standards Institute) criteria. MIC for essential oils were investigated against both standard and clinical isolates of Methicillin-resistant *S.aureus*. In this study, the essential oils of these three plants have been confirmed the antibacterial effect against methicillin resistant *S. aureus*. Also, while the essential oils of *L. nobilis* and *S. officinalis* were found to exhibita significant synergistic activity with antimicrobial drugs, *T. spicata* showed limited synergistic activity compared the others.

Keywords: *S.aureus*, methicillin, resistance, essentialoils, cellculture.

NOVEL ANTICANCER COMPOUNDS OF PROPOLIS AGAINST THREE DIFFERENT CANCER TYPES

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Cancer is currently the second most common cause of death. The drugs used for conventional cancer therapies cause unwanted side effects. At best, these kinds of drugs used to treat cancer patients only extend the patient's lifespan by a few years. Therefore new drug research in cancer treatment is continuing rapidly. Natural products have recently been investigated as promising agents for the different types of cancer. Recently, propolis has attracted attention due to its various of pharmacological properties. In this study, we aimed to investigate the chemical charecterization of propolis samples collected from Hatay region. Besides this, the aim of this study was to estimate the proliferative effects of the propolis samples on three different cancer lines (A549; human lung adenocarcinoma, HeLa; human cervical carcinoma, A498 human renal carcinoma). The GC-MS (gas chromatography mass spectrometry) analyses were performed for the analyses of the constituents of the propolis samples. Cell culture. Human cell cultures (A549; human lung adenocarcinoma, HeLa; human cervical carcinoma, A498 human renal carcinoma) were maintained by weekly transfers in RPMI-1640 medium supplemented with 10% fetal calf serum with antibiotics (penicillin; 100 U/ml and streptomycin (100 µg/ml) at at 37 °C in 5% CO2. In this study, it was shown that these three propolis components (benzoic acid, phenylethyl alcohol, 9-octadecenoic acid) have to be remarkable antiproliferative effects against human lung adenocarcinoma (A549), human cervical carcinoma (HeLa) and human renal carcinoma (A498) cells. These components can be served as promising propolis compounds for further new drug development.

Keywords: propolis, anticancer, drug, cancer cells

NANO-TiO_2 HYDROSOL/COLLAGEN-CHITOSAN COMPOSITE SCAFFOLD FOR WOUND REPAIRING

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Collagen-Chitosan (COL-CS) porous scaffolds have been widely used as a dermal equivalent to induce fibroblasts infiltration and dermal regeneration. To improve the anti-bacterial properties, nano-TiO_2 hydrosol was introduced into COL-CS scaffolds. The TiO_2/COL-CS composites scaffolds were prepared through freeze-drying. Their possible application in wound healing was tested in vitro. Scanning electron microscopy (SEM) was employed to study the micro-structure of the scaffolds. The swelling property and porosity of the composite were investigated. The results showed that the scaffold may provide good permeability and humid environment for wound healing. The SEM images of the scaffold showed a porous feature which would be favorable for cell migration and rapid ingrowth of host fibroblasts and endothelial cells. The nano-TiO_2/COL-CS composite scaffolds could be a promising candidate for wound healing dressing.

Keywords: collagen; chitosan; wound healing; nano-TiO_2

IBUPROFEN-COLLAGEN SPONGES FOR WOUND HEALING

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The aim of this paper was to design and characterize some collagen-ibuprofen sponges, potentially usable in the treatment of inflammation associated to cutaneous lesions and subsequently to the post-lession pain, the *in vitro* drug release evaluation and *in vivo* wound healing test. The collagenic matrices, obtained by collagen-ibuprofen hydrogels lyophilization, uncrosslinked and crosslinked with glutaraldehyde, were characterized by morphological (water absorption), goniometric (contact angle), and biological analysis (enzymatic biodegradation). *In vitro* ibuprofen release was performed with a transdermal sandwich device adapted to a dissolution apparatus. The *in vivo* wound healing test was determined using experimental animals (small rodents) with lesions induced with a special metallic device. Similar release profiles were obtained for the matrices with different composition and the kinetic mechanism was set. The matrices swelling capacity, surface wettability and resistance at enzymatic degradation are in accordance with kinetic results. The animal groups treated with collagen sponges and drug-loaded collagen sponges indicated a much faster wound healing effect compared to a non-treated control group. The study results showed that physical-chemical, biological and biopharmaceutical characteristics, and *in vivo* sponges efficiency are strongly influenced by their composition, the determination of the optimum formulation parameters for the new drug supports being possible by modulating the matrices composition.

Keywords: collagen sponges, ibuprofen delivery, anti-inflammatory effect.

PREPARATION AND CONTROLLED DRUG RELEASE OF SODIUM ALGINATE/MCC HYDROGEL BEADS

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In order to enhance the drug entrapment efficiency and to improve the swelling behaviors of drug delivery system, sodium alginate (SA)/microcrystalline cellulose (MCC) hydrogel beads were prepared with metformin hydrochloride (MH) as model drug. The

hydrogel beads were crosslinked in Ca^{2+}, and the effects of MCC content and the crosslinking time on the properties of the beads were investigated. The chemical structure and morphology of the hydrogel beads were characterized by Fourier Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscope (SEM), respectively. The swelling and pH-sensitivity of the hydrogel beads were studied in both simulated gastric fluid (SGF) and simulated intestinal fluid (SIF). Results indicated that the MCC content of 20 wt% had the highest drug loading capacity and the lowest cumulative release percentage in 30 min in SIF. After prolonging the crosslinking time from 30min to 180min, cumulative release percentages of the beads with the MCC content of 60 wt % decreased by 30% in SIF.

Keywords: sodium alginate, microcrystalline cellulose, drug release.

A NOVEL COLLAGEN/HYDROXYAPATITE/MICROCRYSTALLINE CELLULOSE COMPOSITE FOR BONE TISSUE ENGINEERING

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A novel composite with collagen-hydroxyapatite and microcrystalline cellulose (MCC) was fabricated by biomimetic mineralization, sonication dispersion, dehydrothermal treatment (DHT), freeze-drying, and cold isostatic compaction technique. Fourier transform infrared spectroscope (FTIR), ultraviolet-visible spectrophotometer (UV), scanning electron microscope (SEM), and X-ray diffraction (XRD) were employed to analyze the structure and composition of the resultant composite. Swelling property, mechanical property and degradability of this novel composite were investigated. It is found that the composites prepared are hydrophilic and may swell in simulated body fluid. After being soaked in simulated body fluid for 40 days, it can still keep its original shape. Besides, the compressive strength of the composite is 99.05±1.74 MPa, reached the standards of artificial bone materials and is superior to some present used artificial bone materials. The workl may provide an efficient and alternative for bone tissue engineering.

Keywords: collagen; hydroxyapatite; microcrystalline cellulose

A NOVEL BONE SCAFFOLD MATERIAL BASED ON COLLAGEN/HYDROXYAPATITE/GELATIN COMPOSITE

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A novel bone scaffold with collagen-hydroxyapatite (CHA) and gelatin (Gel) was fabricated using biomimetic mineralization method, combineed with sonication dispersion, crosslinking, blending and lyophilization. The structure and properties of the scaffold were investigated. By the introduction of gelatin into collagen-hydroxyapatite, the scaffold is easy to be shaped with three-dimensional porous microstructure. Both gelatin and crosslinking affect the mechnical properties. The novel collagen-hydroxyapatite-gelatin composite could be a candidate of scaffold materials for bone tissue engineering

Keywords: collagen, hydroxyapatite, gelatin

THE INFLUENCE OF MARINE ALGAE AND NATURAL PLANT OILS ON COLLAGEN-BASED CREAM PROPERTIES

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The aim of this paper was to investigate the effect of various marine algae, natural plant oils and Laurus nobilis L. essential oil on stability, rheological and antimicrobial properties of collagen-based cosmetic cream. For this purpose, 3 types of algae [*Spirulina platensis (Cyanophyta), Haematococcus pluvialis (Chlorophyta) and Laminaria dictyota (Phaeophyta)],* 3 types of natural plant oils (olive, nut and laurel) and one essential oil were incorporated in an comercial collagen-based cosmetic cream which was used as a control. The rheological assessment was carried out by analyzing pseudoplastic flow and thixotropic behaviour, stability was performed by centrifugation during time and microbiological tests were carried out against germs, yeasts and molds, *S. aureus*, coliforms and *E. coli* and *P. aeruginosa*. This work showed that all the tested collagen creams showed a pseudoplastic flow and a thixotropic behaviour which promotes the flow formulation and a corresponding application on the skin and they were stable. Among the all formulations, the best properties were given using the following ingredients: Spirulina platensis, olive oil and laurel essential oil.

Keywords: cream, algae, natural plant oil

CONCEPTION AND ELABORATION OF BIOGELS TO DELIVER ANTI-BIOFILM AGENTS

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Over the past 15 years, the impact of biofilms on persistent infections and their potential role on chronic wounds have been extensively documented. However, up to now, no efficient system to deliver anti-biofilm agents has been described. The aim of this study is to conceive a "smart" dressing against biofilms in chronic wounds. We developed an innovative biogel system containing various anti-biofilm agents to improve eradication of biofilm pathogenic bacteria. The anti-biofilm strategy consisted in preventing bacterial colonization, disrupting the biofilm and eradicating pathogen bacteria (< 10^3 CFU/mL). Combination of PHMB (54 mg/mL), an antiseptic agent and EDTA (10mM) a cation chelating agent, eradicated *P. aeruginosa* and *S. aureus* biofilms. These anti-biofilm agents were entrapped in gelatin gels which have the capacity to deliver molecules with controlled release. This combination in the biogel affected *in vitro* biofilms depending on the gelatin and antiseptic concentrations. The use of ephemeral gels, where the gelatin network hydrolysis by enzymes was programmed and timed-controlled, permitted to stimulate the agent release and enhanced our results on various biofilms. Chronic wounds are a common and expensive problem in public health. Gelatin biogels have a great potential to entrap and deliver antibiofilm agents over a longer period and at smaller concentrations than the current wound care treatments.

Keywords: biogel, anti-biofilms, drug delivery.

COLLAGEN-DOXYCYCLINE SPONGIOUS FORMS FOR INFECTED TISSUES TREATMENT

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The purpose of the present work was to develop and characterize some spongious forms based on collagen and doxycycline, uncross-linked and cross-linked with glutaraldehyde, obtained by lyophilization. The prepared sponges were analyzed by FT-IR spectroscopy, water up-take and optical microscopy. The doxycycline release from collagen spongious forms was investigated

and the kinetic mechanism was determined. The results of this paper indicated that the drug delivery is influenced by cross-linking degree and composition of spongious forms.

Keywords: collagen, doxycycline, drug delivery.

COLLAGEN POLYDISPERSIONS WITH SPECIFIC PROPERTIES FOR SEEDS TREATMENT

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Collagen polydispersions obtained by associated enzymatic and chemical processes for high-yield extraction of collagen from leather waste, under mild reaction conditions, are fit for application in agriculture. The present study highlights the specific properties of collagen polydispersions for cereal seed treatment. Collagen polydispersions were characterized by chemical and instrumental analyses: gravimetric, volumetric, potentiometry, gas chromatography and HPLC, IR spectroscopy, tensiometer methods, Dynamic Light Scattering (DLS). Analytical investigation has shown that the collagen polydispersions have bioactive properties due to the content of free amino acids, with a total of approximately 10 g/100 ml solution and very small sized particles composition, in the 1-10 nm range, able to penetrate the seed coating; the larger sized particles, situated in 100-1000 nm and 1000-10000 nm ranges, ensure the bioactive deposit in the film matrix on the surface; the wetting ability of collagen polydispersions, which is lower than that of water, ensures film matrix formation on seed surface, with long term releasing ability, leading to seed nutrition and stimulating germination. The synergy of collagen hydrophilicity, its known biodegradability, bio-active potential and film-forming properties recommend collagen polydispersions for applications in mixtures for seed treatment.

Keywords: collagen, chromium-tanned waste, seed treatment.

THE INFLUENCE OF SILVER NANOPARTICLES ON THE SURFACE MORPHOLOGY OF FILM-FORMING MATERIALS AND THEIR ANTIMICROBIAL EFFICIENCY

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The surface morphology was investigated, surface area, bacterial adhesion and hydrophilic/hydrophobic character of antimicrobial coating materials. The materials have a different surface morphology depending on the content of silver nanoparticles. The new antimicrobial materials show a low bacterial adherence, facts suggest that the release of Ag^+ ions by the new material could be the major cause for the low bacterial adhesion on these materials. In exchange, the surface morphology matters in the improvement of overall performance. The surface morphology was investigated by SPM and the hydrophilic nature of the material was determined by the Goniometer method. The structural parameters (surface area, pore size distribution, pore volume) were determined by BET analysis. It was demonstrated that our formulations of film-forming materials with nanosilver in their composition have antimicrobial activity at these bacteria: *Staphylococcus Aureus* and *Bacillus Cereus.*

Keywords: nanoparticles, antimicrobial, surface

EXTRACTION OF COLLAGEN FROM FISH WASTE AND DETERMINATION OF ITS AMINO ACID COMPOSITION

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In this paper, the analysis of the most famous ways collagen-containing solid waste recycling of fish and leather industry was made. Their influence on the properties of the obtained hydrolysates was shown. The method for processing of collagen

containing wastes from gutting mackerel (*Scomber*) is developed for the preparation of biopolymer materials for various purposes. The proposed method involves acid-enzymatic hydrolysis of waste in a solution of acetic acid in combination with the previous washing with alkali to remove soluble proteins. By means of ion-exchange chromatography using 339M automatic analyzer (Microtechna, the Czech Republic) have determined that the resulting hydrolyzate is balanced in amino acid composition and can be used to produce organic fertilizer and as growth promoter and as feed additive and after further modification as a component of biopolymers.

Keywords: collagen containing fish waste, acid-enzymatic hydrolysis, amino acid composition.

INVESTIGATION OF PHYSICOCHEMICAL AND BIOLOGICAL CHANGES IN THE COLLAGENS UNDER THE INFLUENCE OF THE PROKARYOTIC ORGANISMS-ACIDS SYSTEM

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Great attention is being paid nowadays to the ecological safety and rational technologies of leather production. New technologies of waste processing make it possible to get products that could find wide application in different industries. Products of collagen dissolution (PCD) are among them. To get a high quality product with specified properties it is necessary to research the characteristics of the modified collagen and to analyze the influence of proteins present both in leather tissue and combined whey. The objective of the research is to study the collagen-chemical and thermo-dynamic properties of modified collagen (PCD) produced on the basis of different nature organic acids and combined whey. In the paper physical and chemical properties of colloid system PCD-acid were investigated. Adsorption and dampening ability, structural, mechanical and rheological characteristics of modified collagen were also defined. There has been found out that the surface activity of the modified collagen produced on the basis of combined whey is the result of symbiotic influence of proteins present both in derma (collagen) and in the combined whey (casein). Research of the mechanism of collagen - acid interaction on properties of collagen dissolution products could make it possible to better understand collagen structure.

Keywords: modified collagen, prokaryotic organisms-acids system, combined whey

MATHEMATICAL MODELS OF COLLAGEN STRUCTURE DISORDERING BY CULTURED MILK COMPOSITIONS

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A lot of enterprises face nowadays the problem of utilizing protein-containing waste. In recent decades based on the results of research aimed to study connective tissue there has been offered a way to utilize protein waste, i.e. to produce on their basis products of collagen dissolution (PCD). The process of PCD manufacturing is a complex of chemical and technological processes based on breaking both alkali- and acid-labile bonds. To decrease protein losses in breaking acid-labile bonds it is recommended to use cultured milk compositions (CMC). CMC are a symbiosis of acid-tolerant microorganisms, as well as organic acid and enzymes produced by them. Objective of the study was to obtain the models of changing physical and chemical properties of PCD in reference with the conditions of the process of disordering its structure. The disordering the collagen structure is a complex multi-stage process. Mathematical modelling has been chosen as the basic method of solving the problem. The feature of the research is the use of cultured milk compositions as acid agent. Research data could make it possible to develop the process and increase the quality of products of collagen dissolution at the cost of preserving in the collagen structure a considerable amount of polypeptide groups.

Key words: collagen, mathematical model, cultured milk compositions

IONIZING RADIATION EFFECTS ON BIOGEL USED FOR SERUM PROTEIN ELECTROPHORESIS

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Irradiation with high energy electron beams allows direct sterilization of the plates with agarose gel packed in sealed aluminium foil bags and used for human serum protein electrophoresis. Human blood serum contains a large amount of protein (6.5 to 8.5 g/dL) and a greater diversity but, in terms of medical interest, the following six show better importance: albumin, alpha 1, alpha 2, beta 1, beta 2 and gamma globulin. The effects of electron beam irradiation upon this biogel and on the process of the proteic fraction separation were investigated at different absorbed doses in order to establish the optimum level. Avoiding dysfunction coming especially from changing of serum, dye or fixing solution or from mechanical defects (cracked gels on the support film) resulted in obtaining satisfactory results, as proved by tests made at 12 months after the agarose gel film making and irradiation. Microbiological decontamination of the agarose gel films irradiated in the dose range 3-12 kGy could be maintained for a period of a year. Also, agarose gel film can be microbiological decontaminated by irradiation with EB in the range 7-11 kGy without undergoing major changes in the electrophoretic properties for a storage period that can be appreciated to 12 months. There are two dose ranges where the irradiated films change more significant the separation of protein fractions: a low dose range between 4 and 6 kGy, and a range of doses between 12 and 20 kGy.

Keywords: electron beam, electrophoresis, agarose gel, proteic fractions

SWELLING AND DRUG RELEASE OF POLY(VINYL ALCOHOL)/GELATIN COMPOSITE HYDROGEL

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Poly (vinyl alcohol)/gelatin (PVA/Gel) composite hydrogel was prepared by freezing-thawing and morphology of the hydrogel was characterized by scanning electron microscope (SEM). The swelling behavior in different pH buffer solutions was studied. With salicylic acid as model drug, the drug releasing process of the hydrogel was investigated. It was found that the polyvinyl alcohol/gelatin composite hydrogel has porous structure. The swelling rate and equilibrium swelling degree increases with the increase of gelatin content in it. The PVA/Gel hydrogel behaves sensitive to the temperature and pH. At the pH of 7.4, the drug release is the fast.

Keywords: poly (vinyl alcohol), gelatin, composite hydrogel

THE EFFECTS OF IRON AND LIGHT INTENSITY ON BIOMASS AND PIGMENT SYNTHESIS OF *Heamotococcus pluvialis* UNDER LABORATORY CONDITIONS

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In the present study the effects of iron and light intensity on biomass and pigment synthesis of *Heamotococcus pluvialis* (Chlorophyta) was studied under laboratory conditions. In the culture medium composed different light intensity (50, 200 ve 475 µmol photon $m^{-2}sn^{-1}$) and by suplementing Fe+EDTA, the species *H. pluvialis* which subjected to 11 hours light and 13 hours darkness photoperiod, growing parameters was determined. The experiments were applied in 2 processes and during the experiment period optical density, chlorophyl-a (mg L^{-1}), dry weight(g/mL^{-1}) and astaxsanthin amount was followed. The results are; while astaxanthin was raising, chlorophyl-a was reduced; raising light intensity and Fe+EDTA supplement make raise the amount of astaxsanthin. The highist astaxanthin value (% 0.768) obtained from the study is provided by 200µmol photon $m^{-2}sn^{-1}$ light intensity with Fe+EDTA supplement ($p<0.05$).

Keywords: Haematococcus pluvialis, astaxanthin, light intensity, Fe, growth

SYNTHESIS OF ANTIMICROBIAL MATERIALS WITH REGENERATIVE FUNCTION BY LBL METHOD

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In this study, a series of COLL(/HA)$_n$/ZnO/Ampi multifunctional materials was obtained by LBL method (consecutive immersions in oppositely charged solutions, each immersion in the oppositely charged solution/suspension being equivalent with one layer of HA). These systems have regenerative role because of the support (COL/HA composite materials with various content of HA), antiseptic and anti-infective due to the synergic presence of ZnO and ampicillin (Ampi). Starting from these premises, different systems were obtained and characterized: COL(/HA)$_n$ and COL(/HA)$_n$/ZnO, COL(/HA)$_n$/ZnO/ampicillin. The coexistence of both components (zinc oxide and ampicillin) is very important because ZnO exhibit long-term antimicrobial activity while ampicillin is rapidly delivered and confers a strong antimicrobial activity, short-term after administration. The final products were characterized by XRD, IR spectroscopy and SEM microscopy. The delivery rate was determined by UV-Vis while the antimicrobial activity was determined by Minimal inhibitory concentration (MIC) adapted from CLSI standard method. It can conclude that drug release and antimicrobial activity are dependent on the composition and consequently on the number of depositions.

Keywords: layer-by-layer process, controlled release, multifunctional materials

III.
SYSTEMS AND TECHNOLOGIES

MATHEMATICAL MODELING OF PLASMA PARAMETERS PROCESSES FOR MULTIFUNCTIONAL TEXTILE

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This paper presents the mathematical modeling for plasma processes treatments used for textile materials functionalization. The subject fabric on this work was made by cotton. In this research it was started from initial known textile structural parameters and some parameters for oxygen plasma treatment. The goals of plasma treatment were to increase activation and cleaning textile material for adherence preparation of the colloidal silver. The main objective was to obtain a textile surface with reduced microbial charge for medical destination. For obtaining the optimal results are required plasma treatment parameters optimization. This optimization was done starting from analyzing the plasma processes parameters variation. This variation and experimental results was formed the start point for developing mathematical modeling presented in this papers.This variation and experimental results was formed the start point for developing mathematical modeling presented in this papers.

Keywords: mathematical, textile, plasma

MEDICAL TEXTILE MULTIFUNCTIONALIZATION BY USING PLASMA TREATMENT

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This paper expose aspects regarding design, development and plasma nanotechnology treatments required for obtain a textile product for medical usage. The multifunctional products presented in this paper are based on natural or synthetic fibers treated in plasma. This work presents fundamental research regarding plasma treatment actions to the physic-mechanical, physic-chemical and structural parameters of the textile materials with different fibrous composition made by natural and synthetic fibers. This work exposes the benefit of the plasma treatment for textile materials characteristics improvement.

Keywords: textile, plasma, medical.

OPTIMIZATION OF ASSEMBLE UPPERS SYSTEMS USING CAD/CAM

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The paper presents the optimization of assembly uppers using CAD/CAM systems based on bibliographic study and analysis of existing manufacturing tehnologies in the enterprise shoe ISC „Cristina Mold-Rom Simpex" SRL, Chisinau city. The purpose of this paper is to improve existing technologies uppers assembly in the company implementing new ways of designing manufacturing technologies footwear with uppers of leather. The practical value is to: develop automated design of technological process of assembling uppers of leather; developing unified database assembly faces technological operations; expanding the base of information about the process of assembly. The need for rapid introduction of high design constantly pressuring all companies producing shoes. Be the first to bring a new style shelves is often the difference between success and failure in business. The case study was conducted at the footwear company EFC "Cristina Mold-Rom Simpex" LLC, with conventional tehnologies and modern tehnologies. They have been made 10 models of shoes, is found the following: between clasical and modern tehnologies is a difference of 1 to 5.0 min; number of workers performing traditional sewing machines, ranging from 1 to 2 workers on the automatic sewng machine made to engage a worker. Active introduction CAD/CAM systems in light is an innovative tehnique that allwows improving the manufacturing uppers enchancing the quality uppers; decreasing the number of workers involved.

Keywords: technology, uppers, CAD/CAM systems.

INNOVATIVE TECHNOLOGIES OF CUSTOMIZED FOOTWEAR FOR ELDERLY AND PROMOTION OF ACTIVE AGING

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This paper highlights the importance of designing and producing customized footwear for elderly while taking into account the profound demographic changes and considering the reduced functioning, capacity and performance, because of ageing changes of the feet. Functioning, capacity and performance are described according to ICF, WHO 2001 (The International Classification of Functioning, Disability and Health). The authors are analysing the phenomenon from an active ageing perspective. Neuromusculoskeletal and movement – related functions may be impaired by ageing itself or by certain health conditions which could make old people more vulnerable. Standing and walking are fundamental for the well-being and preserving the physiologic ranges of these functions is an important goal. The main feature of this domain is the multidisciplinarity which requires the work of multiple professionals: physicians, rehabilitators, engineers, technical staff. The Active Ageing concept includes interventions and policies that aim to reduce premature physical ageing and to empower older people to live healthy, productive, participative and independent lives. Romania has devised the Strategy for Protection of the Elderly and Promotion of Active Ageing supported by the EU, as a part of The National Reform Program. Romania's commitment to Active Ageing concept is substantial for achieving Europe's 2020 strategical goals.

Keywords: active ageing, old foot, The International Classification of Functioning, Disability and Health

SETTING THE ANATOMICAL AND MORPHS-FUNCTIONAL PARTICULARITIES OF THE DIABETIC FOOT PATIENTS USEFUL WHEN DESIGNING SPECIFIC FOOTWEAR

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The study allowed us to establish a set of criteria for rational classification of foot typologies in patients with diabetic based on parameters obtained from the planting footprint analysis. Pathological deviations were determined by comparison with normal foot plantografic parameter values. Thus coefficient previous area in patients with diabetic foot pathology-associated longitudinal flat foot (K1 = 1.24 ± 0.51, RF, K1 = 1.09 ± 0.14 - LF) presents the deviation as both adducted and the abduction of the area and flat foot pathology associated with hallux valgus transverse (K1 = 0.94 ± 0.35, RF, K1 = 0.85 ± 0.83 - LF)- slight deviation in abduction. Transverse arch flattening coefficient and angle of deviation of the big toe associated longitudinal flat foot - K2 = 0.39 ± 0.02, α2 = 8.9 ± 4.5 (RF) K2 = 0.38 ± 0, 01, α2 = 9.2 ± 4.3 (LF) is degree and flat foot hallux valgus associated with cross grades II and III. Longitudinal arch flattening coefficient and the angle of deflection of a flat foot heel longitudinal axis associated - K3 = 1.23 ± 0.62, α3 = -7.4 ± 1.35 (RF), K3 = 1.18 ± 0, 91, α3 = -6.8 ± 1.47 (LF) indicates the deviation degree and valgus. The design of diabetic footwear must be based on a in-depth understanding of the interaction between the footwear design features and the biomechanical characteristics and anatomic-morphs-functional parameters of the foot.

Keywords: foot, diabetes, pathology, anatomic-morphs-functional parameters

INNOVATIVE PROCESSING OF LIGNITE COMBUSTION ASHES TOWARDS CERAMICS SYNTHESIS

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In the present study, novel two-step sintering of lignite combustion highly-calcareous ashes is investigated. So far, solid-state sintering of fly ash through conventional thermal treatment has already been considered for the development of ceramic

materials. Although conventional sintering is generally a preferred manufacturing technique for industrial ceramics, a new two-step method is proposed in the last few years for sintering dense and fine ceramic microstructures. Innovative processing of ashes – produced in massive quantities from lignite-fed power generation units – in the elaboration of value-added ceramic materials represents a challenge with important environmental, technological and economic aspects, due to the intrinsic characteristics of these industrial by-products. For that purpose, disc-shaped compacts from fly ash, bottom ash and ash mixtures were prepared by cold pressing, and then consolidated using two-step sintering procedures: the specimens were first heated at a higher temperature to achieve an intermediate starting density, then cooled down and held at a lower temperature to approach higher densities. The sintered specimens were characterized by means of XRD and SEM-EDX analyses as well as shrinkage, apparent density, water absorption capability and Vickers microhardness measurements. According to the results, effectively solidified ceramic materials are obtained with interesting specific microstructural features and properties.

Keywords: Two-step sintering, lignite combustion ashes, ceramics.

FINISHING TECHNOLOGIES FOR WOOLEN SHEEPSKINS

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In this paper, a finishing composition and technology for nappalan woolen sheep skins are presented. The finishing composition contains a new feel agent – Wax-AGE 7 – based on beeswax, lanolin and triethanolamine monostearate and stabilized with lauryl alcohol ethoxylated with 7 moles of ethylene oxide. The performance of finishing film was investigated by physical-mechanical analysis, optical microscopy and ATR-FITR. Good results for feel and physical-mechanical properties were obtained.

Keywords: woolen sheepskin, finishing, nappalan, feel agent

CASE STUDY ON FAILURE MECHANISM FOR REINFORCED CONCRETE FRAME STRUCTURE WITH DIFFERENT INFILL MATERIAL

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Reinforced concrete frame structures are a wide spread structural system all around the world. Considered to be flexible structures, they are strongly recommended in areas with height seismicity. Several problems may occur due to different stiffness between the infill material and the reinforced concrete frame structure. Two major failures may appear – to crack the infill material or to damage the columns from the structural system. The second one is more unfavorable, and the only solution is to demolish the entire structure. The paper aim is to present a solution for this problem. For this purpose several numerical simulation are done using traditional material for the infill wall and an innovative solution. The results show that a flexible infill material lead to a better behavior for the system.

Keywords: infill material, stiffness, polyurethane.

FOOTWEAR PLANTAR MECHANICAL COMFORT: PHYSICAL MEASURES AND MODERN APPROACHES TO THEIR APPROXIMATION

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Comfort is a fairly complex subjective phenomenon consisting of physiological, psychological and physical aspects. Foot mechanical comfort is defined and two major groups are distinguished: dorsal and plantar. Plantar mechanical comfort is concerned with the interaction of the foot with the footwear sole and the ground. The most important mechanical phenomena and

quantities related to plantar mechanical comfort and their relation to foot anatomy and physiology, footwear design and use activities are discussed. Though measurement and prediction tools for comfort aspects exist, there is limited evidence regarding integration of different approaches towards the complete measurement, calculation or approximation of plantar mechanical comfort aspects. The most appropriate measures for complete plantar mechanical comfort evaluation are proposed. Taking into account the modern trend towards applying computer simulation and optimization techniques, an account of attempts to evaluate mechanical plantar comfort for upright human standing and walking with the aid of Finite Element Analysis is given.

Keywords: footwear design, mechanical comfort, plantar comfort evaluation.

SEISMIC RESPONSE OF BUILDING STRUCTURES WITH PASSIVE FLUID DAMPERS

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This paper presents the numerical results of several passive viscous fluid dampers implemented to a real three-storey building to improve the seismic structural performance. For strong earthquakes, a large amount of input energy will be dissipated by inelastic deformation which means structural damages take the form of localized plastic hinges. Energy dissipation demand of the main building elements can be reduced by transferring this energy dissipation demand to the viscous fluid dampers. These devices operate on the principle of the flow of special compressible fluids through orifices and are characterized by a high cycle-fatigue life. Some examples of experimental studies to understand the principles of the operation of the fluid devices for seismic energy dissipation are briefly described. A common mathematical model for describing the linear or nonlinear behavior of viscous fluid dampers in terms of force-velocity curves is presented. Numerical simulations have been performed in order to assess the performance of a structure protected with such devices. The additional of passive viscous fluid dampers demonstrates a reduction of the input energy and of the deformation in structure, this way improving the structural seismic protection.

Keywords: viscous fluid damper, seismic protection, energy dissipation

DESIGN CRITERIA OF TUNED MASS DAMPER SYSTEMS TO CONTROL VIBRATIONS OF BUILDING STRUCTURES

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This paper investigates the effectiveness of a passive Tuned Mass Damper (TMD) attached to a three story building in reducing the response of the structure to harmonic and seismic excitations. Some examples of existing building structures that contain tuned mass dampers are briefly described. Generally, inertial mass is attached near the top, through springs and viscous damping mechanisms. The frequency of the TMD is normally tuned to a particular frequency of the structure so that the two peaks of the frequency response curve of the damped system have the same dynamic amplification, when expressed in terms of displacements. Design charts and equations to determine the optimum values of mass, damping, and stiffness for a passive TMD are illustrated. Numerical simulations have been performed to assess the optimum TMD efficiency in reduction of the seismic and harmonic response of the structure. In addition, this paper shows that a TMD is more effective to mitigate the vibrations induced by harmonic loads than earthquakes.

Keywords: tuned mass damper, vibration, seismic excitation

PATHOLOGICAL CONDITIONS REQUIRING THE USE OF CUSTOMIZED LASTS

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A customized last is a last used for a subject whose pathological condition does not allow the use of a mass-manufactured last. This paper evaluates foot pathomechanics that can influence the design of customized lasts for therapeutic footwear. It investigates ways of evaluating a pathological condition that causes morphological changes that require the use of customized lasts. The result of this study is a method of defining pathological conditions that lead to consideration of morphological parameters which are not required for mass-manufactured lasts. Designing the customized lasts necessary for medical shoes only

based on the mass-manufactured last design system leads in most cases to failure. In conclusion, the customized last designer must have knowledge regarding the evaluation of those pathological conditions that require customized lasts. In the absence of such knowledge the customized last can only be the basis of a final functional and comfortable therapeutic product after a lengthy process based on gaining experience through trial and error.

Keywords: therapeutic footwear, pathological conditions, customized last

ASPECTS REGARDING NATURAL DYEING OF ENZYMATICALLY PRE-TREATED CELLULOSIC BLENDED YARNS

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The objective of this study was to investigate the effects of preliminary enzyme treatments and natural dyeing on the characteristics of yarns made from fibrous blends of cotton and enzymatically cottonized hemp. To attain the cottonized hemp fibres, enzyme and ultrasound treatments were simultaneously applied. The cottonization of technical hemp fibres was performed to remove lignin and pectin from the middle lamella in order to obtain small bundles of elementary fibres, with similar features as those of cotton. To investigate the impact of enzyme processes on the characteristics of hemp fibres, physical-mechanical and physical-chemical investigations, including RAMAN spectroscopy and AFM were used. The cottonized hemp and cotton fibres were used to make yarns that were subsequently pre-treated with pectinase, thereafter a natural dyeing with *Allium Cepa* extract was applied. The enzyme pre-treatment was followed by a treatment with tannic acid and pre-mordanting with potassium or iron alum. To determine the efficiency of the enzyme pre-treatment process on natural dyeing, colour measurements and dyeing fastness to washing, light, acid and alkaline perspiration were carried out.

Keywords: enzymatic pre-treatments, natural dyeing, *Allium Cepa*

RADIATION VULCANIZATION OF NATURAL RUBBER USING TMPT AS POLYFUNCTIONAL MONOMER

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In our study, the effect of trimethylopropane trimethacrylate (TMPT) as polyfunctional monomer on radiation vulcanization (electron beam, EA) of natural rubber (NR) was evaluated. Gel fraction, crosslink density and FTIR of the natural rubber/TMPT samples have been investigated as a function of absorbed dose. The dependence of gel fraction and crosslink density on irradiation dose was determined from in the dose range of 100 to 250 kGy. The results showed an increase in gel fraction and crosslink density due to the introduction of TMPT.

Keywords: natural rubber, electron beam, trimethylopropane trimethacrylate, gel fraction, crosslink density, FTIR

INVESTIGATION OF COLOR STABILITY OF NATURALLY DYED DENIM GARMENTS

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Natural dyes represent an essential part of the world's ecological and cultural heritage; their selection and usage to create colors are common to all civilizations. In the new era of synthetic dyes, research is focusing on identifying environmental friendly dyeing solutions and on the need for a sustainable "green economy". Natural dyes provide important alternative to petrochemical-based dyes and offers environmental and social benefits in comparison with synthetic dyes. Natural dyes are organic compounds and are, therefore, vulnerable in some degree to the action of destructive agents such as light, moisture, detergents, which may conduct in color fading. The study provides useful information regarding color fastness properties of naturally dyed denim garments, obtained within ERANET

CROSSTEXNET project VEGDENIM, coordinated by MODAZEN Turkey. Using conditions for the tests specified in different ISO and EN standards, a direct comparison of L*, a*, b* values, for change in color and staining were undertaken. The results of the study indicated that using Punica Granatum and Walnut Shells deeper and more stable shades of colors are obtained in comparison with Indigofera Tinctoria dyed denim samples. All treated samples highlights a change in color in the sense of fading which has occurred to the highest extent when exposed to artificial light and washing.

Keywords: vegetable dyes, denim, color fastness

"SYNTAN" AND "SYNTHOL" – A RESPONSE TO CURRENT ISSUES

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In this paperwork are presented some solutions needed for both, professionals and beginners in the "secrets" of retanning leather. Modern management of the leather business involves a large number of skills and guidelines, many of them involving skills related to the problem, solving rational and logical thinking. Also, the paper presents real solutions -syntans lineup, because leather and fur skins items have restrictions on the content of some chemicals considered toxic under the regulations stipulated in the various product standards or technical specifications. Importance of the retanning operations has increased recently because of liming and tanning operations, which are more streamlined. Today, everything is done through a standard process, and the specific properties of different types of leather are adjusted during retanning and fat liquoring. To obtain the desired character of the finished leather product combinations are used, each recipe so perfectly combined tend to find the optimum, to match the desired leather sample.

Keywords: syntan, synthol, retanning.

THE CUSTOMIZED FOOT WEAR FOR ELDERLY – ASSISTIVE PRODUCT ACTING AS A FACILITATOR FOR REDUCING DISABILITY WHILE ENHANCING THE QUALITY OF LIFE FOR OLD PEOPLE

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"The 2012 Aging Report", an extensive document of analysis and prognosis, recently published by EU, estimates that in 2060 over 30% of the population of the European countries will be older than 65. The demographic ageing enhances the importance of research in the field of independent living and social integration of the elderly, important aspects for both the old people and the society. It has been proven that up to 40-50% of the old people have lost their autonomy and need home long-term care because of the walking impairments. Walking disorders in elderly are mostly caused by: the impaired capacity to integrate the proprioceptive stimuli, the associated health conditions and the degenerative morphologic and functional alterations of the foot. In 2003, ISO 9999, taking over the terminology of the ICF (The International Classification of Functioning, Disability and Health, WHO 2001) defined the concept of *assistive product.* The authors are analysing all the possible biomechanical changes of the old foot in order to design customized footwear. The customized footwear which fits the morphologic and functional modifications of the old foot might become an assistive product acting as a facilitator towards diminishing the age-related disability.

Keywords: ageing foot, assistive product, special shoe

RESEARCH ON DETERMINING THE EXPRESSION OF HARDNESS VARIATION OF MATERIALS USED IN SHOE HEEL MANUFACTURING DEPENDING ON THE MEDIO-LATERAL COMPONENT, Fy, OF THE GROUND REACTION FORCE

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This study was aimed at obtaining an empirical relationship in order to use hardness of materials in constructing a custom heel depending on the medio-lateral component, Fy, of the ground reaction force. Custom heeled orthopedic footwear is designed for people with no structural or functional abnormalities in the lower limb, but who value comfort in wearing shoes to the detriment of other aspects related to heel height or shape. The three components of the ground reaction force, namely: the vertical component, Fz, the antero-posterior component, Fx, and the medio-lateral component, Fy, upon ground contact, were measured with AMTI's AccuGait force plate, using the NetForce component, and they were analyzed using the BioAnalysis module. Tests were conducted to analyze materials with various hardness values used in the construction of a custom heel. Thus, after determining the relation, depending on the desired value of the medio-lateral component, Fy, of the ground reaction force, the hardness required for the construction of the custom heel is obtained.

Keywords: hardness, custom heel, ground reaction

IV. ENVIRONMENT

EVALUATION OF LEATHER BIODEGRADABILITY

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This paper presents a study regarding the biodegradability of tree types of finished leathers tanned with different tanning agents: based on Chromium (III), based on Ti-Al, based on Ti-Zr. For assessment of leather biodegradation, EN ISO 20200:2005 was used as method. Physical-chemical analyses were performed on leathers at initial state, after 90, 120 and 220 days of composting. The conclusion of the study is that all types of tanned leather studied undergo the biodegradation process but at different rates. A hierarchy was established for leathers taken in this study, as follows: leather tanned with Ti-Al, leather tanned with Ti-Zr, leather tanned with chromium, where chromium (III) tanned leather has the lowest rate of biodegradability.

Keywords: leather tanned with inorganic salts, composting, biodegradation.

ENVIRONMENTAL ASPECTS FOR LEATHER FROM A LIFE – CYCLE PERSPECTIVE. PART I: METHODOLOGY

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The goal of this paper is to quantify the environmental impact of new pre-tanning technology with Ti-Al tanning agents, developed during the execution phase of INNOVA-LEATHER project, as well as the thereof assertion of their improved environmental performance when compared against commercial chromium (III) tanning, currently applicable for the production of eighty five per cent of the total volume of finished leathers by the tanning industry worldwide. LCA study was performed using the GaBi 6.0. software and databases in accord with the ISO standard 14044:2006: Environmental management - Life cycle assessment - Requirements and guidelines. Part I of this paper presents the methodology and data collection activities.

Keywords: leather, LCA, chrome tanning, Ti-Al tanning, carbon footprint

ENVIRONMENTAL ASPECTS FROM A LIFE –CYCLE PERSPECTIVE FOR TWO LEATHER TANNING SYSTEMS. PART II: IMPACT ASSESSMENT

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Keywords: leather, LCA, chrome tanning, Ti-Al tanning, carbon footprint

INFLUENCE OF LAND USE ON MICROBIOLOGICAL ACTIVITY OF SANDY SOILS

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Major interrelated factors affecting microbiological diversity in soil include soil forming processes, physico-chemical properties of soil, soil particle size distribution, vegetation, and land use type. In the south-east Romanian Plain important land use changes occur in the last two decades. The aim of the study is to analyze the influence of the land use on the microbiological properties of sandy soils. We examined five sites, representing four different land-use types (cultivated land, vineyard, acacia forest, and pasture), in the south-east Romanian Plain. The soil profiles were described in the field and sampled (from each genetic horizon), after the removal of forest litter, for particle size distribution, pH, $CaCO_3$ content, organic matter content, V8.3% analyses, conforming to RISSA Methodology-1987. For microbiological analyzes three indices were determined: number of heterotrophic bacteria, number of microscopic fungi and soil respiration. Soil respiration, as a global indicator of soil microbial activity, has the highest values for pasture, while lowest values for bacterial and fungal microflora were recorded under vineyard use, reflecting soil life response to anthropic interventions.

Keywords: sandy soils, microbiological activity, land use.

HYDROPHILIC INTERACTION LIQUID CHROMATOGRAPHY FOR CONVENIENT ANALYSES OF POLAR PESTICIDES

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Pesticides are used in plant protection products. Once applied appear the question of their dosing both in plants intended for consumption and the environment. Liquid chromatography may be successfully used for the analysis of nonvolatile and thermolabile pesticides. The most common type used is reversed phase (RP-HPLC). However, very polar and ionic pesticides shall not be retained in RP-HPLC. Therefore, a convenient solution is HILIC. Lipophilic Hydrophilic Chromatography is a type of liquid chromatography that used mobile phases for RP-HPLC on normal-phase stationary phases. This paper aims to highlight applications of HILIC in the analysis of a polar pesticide using liquid chromatography coupled with mass spectrometry.

Keywords: HILIC, liquid chromatography-mass spectrometry, pesticides residues.

NEW METHOD FOR BIODEGRADABILITY OF COLLAGEN AND KERATIN BASED MATERIAL ASSESSMENT

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Biodegradability of widely-used materials has become an important environmental property and a market tool for high quality articles intended for responsible consumers. Assessing biodegradability of natural furskins is a difficult endeavour due to the complex composition of natural fur skins. Originality of research consists in elaborating a method of assessing biodegradability of sheep furskins based on specific microorganisms for collagen and keratin degradation. In this regard, preparations with collagenase and keratolytic activity were developed and characterized by determining enzymatic activity before and after concentration and conditioning. Strains were identified using BIOLOG – Microbial Identification system. Experiments on biodegradation of natural furskins were performed in the WTW – OxiTop device and have enabled assessment of biodegradability by determining biochemical oxygen demand every 3 days for a 45-day period. Selected strains have shown ability to hydrolyze furskins at the end of their life cycle. The elaborated method enables biodegradability assessment of natural furskins in a shorter span of time compared to similar methods for plastics, which take minimum 6 months, and require much higher costs.

Keywords: biodegradability, furskin, collagen, keratin, enzymatic activity, specific enzymes.

MODELING THE MOVEMENT OF NITRATES THROUGH THE SANDY SOIL CONSIDERING HOMOGENOUS SOIL PROFILE

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Nitrate is one of the most common chemical contaminant found in groundwater because it is a moderate solute in soils and could move quickly through the soil profile leading to plant nutrient loss and groundwater pollution. The intensive application of nitrogen fertilizers in agriculture can cause nitrate contamination of ground water above the 50 mg NO3-/L (WHO guideline value for drinking water).This paper reports an application of a model in order to investigate the migration process of nitrates through the sandy soil under different pore water velocities. The tests were carried out using two dimensional numerical models SEEP/W and CTRAN/W with homogeneous soil. SEEP/W computes the water flow velocity, volumetric water content, and water flux and CTRAN/W uses these parameters to compute the contaminant migration. These models are useful tools in predicting the effects of measures and can be used to optimize agricultural practice aiming to minimize the impact on the environment. For the sandy soil, the amount of nitrate adsorbed into the soil is higher than any other soil types such as loam or clay. Nitrate sorption in the sand is influenced by environmental Conditions such as temperature, humidity, type of natural soil and common irrigation practices. The results also show that water pressure and nitrate concentration was highly affected by soil type and water application boundary conditions. All of these variables are contributing to the migration process of nitrate in soil.

Keywords: nitrate concentration, Advection-dispersion Process, Two-dimensional Model, Homogeneous soils.

POLLUTANTS MINIMISATION AND INNOVATIVE MONITORING TECHNIQUES TOWARD A SUSTAINABLE LEATHER INDUSTRY

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Sustainable development is a deep-seated value of the EU and encompasses issues of great importance to citizens, whether it be maintaining and increasing long-term prosperity, addressing climate change or working towards a safe, healthy and socially inclusive society. It is an overarching objective of the EU set out in the Treaty, governing all the Union's policies and activities. It aims at the continuous improvement of the quality of life and well-being on Earth for present and future generations. It promotes a dynamic economy with full employment and a high level of education, health protection, social and territorial cohesion and environmental protection, in a secure world, respecting cultural diversity as set out by Brundtland in 1987. Leather production fulfils a fundamental role in our society. It recovers the hides and skins resulting from the production of meat (for human consumption) and transforms them into a noble material that finds applications in a myriad of consumer goods. It thus prevents a difficult waste disposal problem and contributes with a useful and appealing material to our modern lifestyle, generating wealth and employment. Leather industry is, however, an environmentally intensive activity that can carry adverse effects to water, air and soil if the plant does not apply pollution prevention techniques. The new innovative technological & monitoring system for pollutants minimization, presented in the paper, will catalytically act for: improving the quality of the working environment, reducing/eliminating the pollutants, facilitating the implementation of the EMS and eco-labeling in the Romanian leather sector, contributing directly to its competitiveness and sustainable development.

Keywords: tanning & footwear industry, monitoring system, emissions, sustainable production

EXTRUDED AND SINTERED CLAY CERAMICS CONTAINING STEEL-MAKING DUST

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In the present work, the feasibility of recycling a steel-making by-product into extruded clay-based ceramics is examined, with the emphasis put on their mechanical performance. Actually, the utilization of massive amounts of solid residues recovered in

steel production plants worldwide, such as steel-making dust (electric arc furnace dust, solid waste from gas treatment), is of increasing importance. This fine powdery residue, however, contains several oxides (mainly iron and zinc oxide phases), and therefore it could be considered as secondary material for substituting traditional clayey materials in ceramics manufacturing. For the fabrication of extruded specimens, a laboratory pilot-plant simulation of the industrial processes was employed. Clays appropriate for standard brick manufacturing were selected as the base materials and characterized. Then, various clay/steel dust mixtures were prepared and mixed with water to form a plastic mass for extrusion of specimens. The extrusion procedure and drying behavior of specimens were optimized in order to obtain integral specimens possessing sufficient green density and strength for the subsequent sintering at 850, 950 and 1050°C, in a controlled furnace. The effect of the % by-product content, and also of the firing temperature, on shrinkage, bulk density, water absorption capability and mechanical strength of the fired specimens was investigated. According to the results, the addition of steel-making dust up to 15 wt. % in clay-based bricks is tolerable without significant variations in the mechanical performance, while the open porosity slightly increases, which could be of importance in terms of heat insulating behavior.

Keywords: Ceramics, extrusion, sintering, steel-making dust.

NOVEL FLOCCULANTS BASED ON ACRYLAMIDE AND ACRYLIC ACID OBTAINED BY ELECTRON BEAM IRRADIATION

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Water pollution results from all human activities: domestic, industrial and agricultural. The literature reports a multitude of processes for the decontamination of contaminated water and wastewater such as coagulation, precipitation, extraction, evaporation, adsorption on activated carbon, ion-exchange etc. Coagulation/flocculation is a frequently applied process in the primary purification of industrial wastewater. There are two major classes of materials used in coagulation/flocculation processes: (1) inorganic and organic coagulants including mineral additives, hydrolyzing metal salts, pre-hydrolysed metals and polyelectrolytes (coagulant aids); (2) organic flocculants including cationic and anionic polyelectrolytes, non-ionic polymers, amphoteric and hydrophobically modified polymers, and naturally occurring flocculants (starch derivatives, guar gums, tannins, alginates, etc.). In Romania, the obtaining and using of polyelectrolytes for residual and surface water treatment is not so developed because the advantages of their use are not well known, these being the following: (a) reduce the quantity of classic electrolytes needed by 25% up to 50%; (b) concentrations of 10 to 100 times smaller of classic materials are used, the final volumes of reagents which are used in water treatment are considerably decreased, saving space, labour, energetic consume, means of transport; (c) they do not produce metallic residuals in the mud left after water purge; (d) reduce by almost 60% the volume of the resulted mud by using them in comparison with the volume resulted from classic material treatment, which it reflects in the space economy for depositing the mud resulted from the purifying stations; (e) reduce by approximately 5-10 times the contact, stationary and decantation time which determines a shorter process of water purifying; etc.

Keywords: flocculants, copolymerization, acrylamide, acrylic acid, electron beam

RED MUD AS MULTIFUNCTIONAL MATERIAL FOR POLLUTANTS CAPTURING FROM WASTEWATER

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Red mud is a waste of alumina manufacturing from bauxite using the Bayer process, containing a mixture of minerals with ion exchange properties. Previous experiments have demonstrated the ability of red mud, raw or processed, to capture and retain chromium ions from wastewater and sludges. The present study highlights the ability of chemically modified red mud to capture other organic and inorganic substances, such as those found in effluents of hide processing. Laboratory analysis of the residual solutions, before and after treatment with the mineral complex of red mud, by potentiometric, gravimetric, photocolorimetric, and spectrophotometric methods, has shown that: the phosphate and sulphate content can be reduced by 80-99%, depending on their pH, silicon content can be reduced by 93%, the content of metal-complex dyes can be reduced to 100 % for blue dyes range, the chemical oxygen demand can be reduced by approximately 85%. The mineral complex of red mud is a multifunctional material for wastewater treatment, by simple, effective, and reproducible processes, which can be embedded in the composition of building materials and design of roads.

Keywords: mineral matrix, multifunctional, wastewater.

ASSESSMENT OF LEATHER AND LEATHER SUBSTITUTE WASTE BIODEGRADABILITY UNDER AEROBIC CONDITIONS IN LIQUID ENVIRONMENT

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The leather and footwear industry is one of the industries that generate large amounts of leather and leather substitute waste. Waste biodegradation is assessed through tests performed under aerobic conditions in the soil, in an aqueous medium under composting and anaerobic conditions in an organic waste anaerobic digester or under similar conditions in the laboratory. The aim of this paper is to comparatively study biodegradation under aerobic conditions in liquid medium of three types of materials used in the leather and footwear industry, namely: chrome-tanned leather, vegetable-tanned leather and synthetic leather. Biodegradability study was conducted in accordance with EN 13432/02 in a facility for waste biodegradation in liquid medium under aerobic conditions (EN ISO 14852-05). To characterize the biodegradation process, the following were monitored for 100 days: conductivity, total organic carbon content (TOC), total organic nitrogen content (TON) and the degree of waste biodegradation.

Keywords: biodegradation, chrome-tanned leather, vegetable-tanned leather, synthetic leather

RECOVERY OF TANNERY WASTES FOR FUNCTIONAL MICROENCAPSULATED PRODUCTS

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Leather is one of the most used materials in the footwear and leather goods industries, and is also employed in the manufacture of a variety of products in the clothing/garment industry as well as in furniture upholstery. Even though the tanning industry is considered to play an important environmental role as users of a by-product of the meat industry, the different stages involved in the transformation of hides and skins into leather generate a significant amount of wastes, both liquid and solid. In this sense, the advancement of European policy and legislation protecting the environment has prompted the transformation of tannery solid waste materials into valuable co-products that can be recycled or employed in other industries. The paper focuses on the recovery of collagen derivatives from untanned solid wastes, more specifically by isolating gelatine in order to use it as a natural microencapsulating agent in the production of active materials with functional properties. Gelatine was the first shell-forming material used in microencapsulation and, nowadays, it is still a promising material for the creation of natural and biodegradable microcapsules. In the footwear industry, microencapsulation can transform a traditional shoe into an "active shoe" that ensures the continuous care of our feet by the incorporation of microencapsulated products with therapeutic and/or antimicrobial properties. This work describes the project and the results obtained to date.

Keywords: gelatine, tannery wastes, microencapsulation.

FORMULATION OF NANOCOMPOSITES FOR FOOTWEAR WITH ENHANCED COMFORT AND SAFETY PROPERTIES

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Over the last years, huge research has been made on the developing of advanced, innovative, high-performance, nanotechnology-based polymeric materials. As a result, the development of nanofilled plastics, the so-called polymer nanocomposites, has allowed the introduction of new combinations of properties, which consequently enables new applications for plastics. For this purpose, INESCOP is working in the European project NANOFOOT (FP7-SME-2013-2-606570) which focuses on the implementation of nanotechnology in footwear materials and components in order to impart antimicrobial properties, electrical and thermal conductivity, water resistance, breathability, etc., with the main objective of obtaining high added value and marketable materials and footwear. The development of thermally conductive nanocomposites is expected to contribute to an improvement of comfort, since such materials would improve the dissipation of overheating which is produced within the footwear during use. With regards to antistatic nanocomposites, their implementation in the footwear industry would improve both comfort and security as they will reduce the electrostatic charges accumulation. Last but not least, the development of nanocomposites with antibacterial and antifungal properties will improve both comfort and foot health. This paper focuses on the

development of foamed EVA-base nanocomposites for insoles, with expected electrical and thermal conductivity properties. Several aspects related to the nanocomposite processability have been evaluated.

Keywords: insole, nanofiller, antistatic.

GROWTH OF LEATHER SECTOR IN ASIAN COUNTRIES AND RECENT ENVIRONMENTAL DEVELOPMENTS IN WORLD LEATHER SECTOR

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The leather production activities, specifically raw to semi-finishing processes have been shifted from United States, West European countries to Asian, South American and other developing countries. Annual World Leather process is estimated at 16 million tons of hides and skins. More than 50% of World leather production is done in Asian countries such as China, India, Vietnam, Bangladesh, Pakistan, etc. Wastewater discharge from Asian tanneries is more than 350 million m3/annum. Solid waste generation is about 4 million tons/year. Safe disposal of chrome containing sludge which is about 6 million tons/year from the entire World leather sector is one of the major unresolved issues. Environmental regulations and standards are similar in developing and developed countries. Certain parameters are more stringent in developing countries when compared to the developed countries. Major investments are being made for the environmental protection systems and resettlement of tanneries from urban areas to the industrial parks with Common Effluent Treatment Plants (CETPs). New regulations such as restriction on use of chemicals, control on salinity and water recovery under zero discharge concepts, management of chrome containing sludge etc. envisage continued applied Research & Development activity. Asian International Union of Environment (AIUE) Commission has got about 30 technical members from all major Leather producing countries in Asia, Russian Federation, IULTCS, UNIDO and European Union (EU). The recent technical developments to meet the environmental challenges with specific reference to Asian countries, Europe and Latin America are dealt in this technical paper.

Keywords: AIUE, Environment, Asian Leather

BLOOD LEAD CONCENTRATIONS OF HORSES AND DONKEYS IN THE VICINITY OF HEAVILY POLLUTED RIVER BY INTENSIVE INDUSTRY IN SOUTHEASTERN TURKEY

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The aim of the present study was to determine the concentration of Pb were assessed in the blood of horses and donkeys which were living in the vicinity of Nizip River where is the discharging area of intensive industry of Gaziantep City. A total of 66 (< 15 years) male horses and donkeys (41 horses and 25 donkeys) were sampled during 2005-2006. The concentration of the blood Pb concentrations were determined by the atomic absorption spectrometry (AAS) method. Mean concentrations of Pb in horses blood serum ranged from 0.06 to 1.88 ppm, and in donkeys from 0.20 to 2,23 ppm. The study allows concluding that the levels of Pb in both horses and donkey are significantly high depending on the feeding or grazing by the products that are grown in the agricultural area where irrigated with pollutioned river water or using it as a drinking sources.

Keywords: blood serum, donkey, horse, lead, pollution

V.
CULTURAL HERITAGE

EFFECT OF TEMPERATURE AND RELATIVE HUMIDITY ON VEGETABLE TANNED LEATHER STUDIED BY THERMAL ANALYSIS

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The present paper reports the results obtained by Differential Scanning Calorimetry (DSC) and Micro Hot Table method (MHT) for new vegetable tanned leathers exposed to 80°C and 80% RH for 1 to 32 days. DSC measurements were carried out both in water excess (heating rate 10 C•min^{-1}, temperature range 25 to 110°C), and under nitrogen flow (heating rate of 10 K•min^{-1}, temperature range 25 to 280°C). MHT method was used to measure the shrinkage temperature of collagen fibres. The results on hydrothermal stability obtained using these two techniques were compared. In general, collagen denaturation and shrinkage temperature decreased with time exposure, whereas the melting temperature of collagen crystalline fraction, obtained by DSC analysis in dry nitrogen flow, remained practically constant.

Keywords: vegetable tanned leather, DSC, MHT.

EFFECT OF ACID RAIN ON VEGETABLE TANNED LEATHER

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Abstract: In order to study the influence of gaseous pollutants on leather, the artificial acid rain was used to soak the vegetable tanned leather, and then the leather was aged for 25 days in 50°C and 100% relative humidity to accelerate the aging speed. The mechanical properties, micro hot table (MHT), FT-IR, optical microscope, DSC and TG were used to analyze the change of leather during the aging process every 5 days. The results showed that the mechanical properties and shrinkage temperature of aged leather were decreasing, and the collagen fibers were damaged and leaded the amide I and amide II band moving to low wave number. Furthermore, the thermal denaturing temperature and the temperature of decomposition at max rate of aged leather were both dropped too. The longer aging time was, the more obvious impacts existed. In conclusion, the artificial acid rain has a significant aging effect on vegetable tanned leather.

Keywords: artificial acid rain; vegetable tanned leather; accelerated aging

CHARACTERIZATION OF THE EFFECT OF HEAT ON VEGETABLE TANNED LEATHER AND RESTORATION TRIALS THROUGH ENZYMATIC PROCESSES

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Cultural heritage artefacts made on leather may suffer from adverse condition during conservation that results in an irreversible change of their chemical and physical properties. Our research aims to develop a new restoration approach for leather having lost

its flexibility after exposure to heat. The characterization of heat-damaged leather was performed by various technics such as Dynamic Mechanical Analysis (DMA) and contact angle measurement. Heat causes darkening, mass loss, shrinkage, stiffness increase and renders leather non wettable. Part of these changes can be due to an aggregation of leather proteins as a result of heat exposure. An innovative method relying on the use of biological molecules was developed in order to respect the nature of the object and preserve its past and future. Enzymes such as hydrolases able to break the protein aggregates have been used. One of the challenges was to provide water necessary for the enzyme activity without wetting the leather surface to avoid further damage of the leather. Several procedures were tested and compared to decrease water availability/activity, and first promising results were obtained with an enzymatic emulsion allowing a flexibility gain of about 20% of heated leathers. Moreover the efficiency of the enzyme in this treatment has been demonstrated. Attempts to restore will be pursued in this direction.

Keywords: leather, heat, enzymes

GARMENT OBJECTS - ARTISTIC EXPERIMENTS IN FASHION

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In the contemporary context of interferences between different ways of creative expressions and the approach of new technologies, fashion reaches a new position by modelling, interpreting and providing the garment with a new expression, when connected to its historical past. Thus, besides the usage of conventional techniques and materials, it often uses new and revolutionary materials and techniques resulted from the scientific research.

Keywords: garment object, experiment, materials, new techniques

STUDY ON MECHANICAL PROPRIETIES OF GAMMA IRRADIATED LEATHER AND PARCHMENT

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Cultural heritage is ineffably degrading due to physical, chemical and biological factors. If physical and chemical degradation can be delayed by controlling the storage conditions, the biological attack, once installed, can be stopped only by a drastic intervention. Among others, ionizing radiation treatment has the advantages of: the certainty of biocide effect, fast treatment, mass treatment, no harmful chemicals and residues. Although, because of the complexity and diversity of the constituents of cultural heritage items, there is always a question: if the radiation induces a supplementary degradation in the material. Literature reports show an increase use of radiation treatment for microbial decontamination of wood, painted wood and paper. Few experiments were conducted on leather and parchment. The purpose of this study is to test several mechanical proprieties of irradiated leather and parchment. Samples from leather and parchment were irradiated at doses from 10 kGy up to 50 kGy. For doses below 10 kGy we can consider that changes in mechanical strength of both parchment and leather samples is insignificant (lower than uncertainty of the measurement) but this should be confirmed by other analytical methods. Generally it is known that crosslinking is the predominant effect of irradiation in case of collagen. In our experiment an increase of the mechanical strength it was observed only in case of leather, for doses of 25 kGy and above. The absence of crosslinking in case of parchment can be explained by the lack of the sites which can support crosslinking.

Keywords: gamma irradiation, parchment, leather.

STUDY OF GAMMA IRRADIATED OIL PAINTING SAMPLES BY FTIR AND FT-RAMAN SPECTROSCOPY

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Gamma irradiation treatment is an efficient means of mass decontamination of art objects such as oil paintings. The investigation of possible physical and chemical changes induced by gamma irradiation in the materials used in oil painting increases the confidence of conservators/ restorers in this still exotic decontamination method. The aim of the present work is to evaluate by different spectroscopic techniques changes induced by gamma irradiation in oil painting samples prepared with pigments of

historical importance. In this respect we have used four series of samples: untreated, γ-irradiated, thermally treated, thermally treated and γ-irradiated. Characterization of molecular structure was performed by FTIR and FT-Raman spectroscopy.

Keywords: pigments, Gamma irradiation, FTIR and FT-Raman spectroscopy

AUTOMATIC DETECTION OF COLLAGEN FIBRES SHRINKAGE ACTIVITY USING Σ-Δ FILTERING

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The thermally-induced structural collapse of collagen fibres in collagen-based historical materials and artefacts such as leather, parchment and skin is currently measured through the Micro Hot Table (MHT) method. This method, widely used in conservation-restoration for characterising historical materials' deterioration, is based on a combined thermal and microscopic technique which evaluates the motion behaviour of the collagen fibres dispersed in aqueous milieu and heated at 2°C·min inside a thermostatically controlled heating cell. The collagen fibre motion observed by a stereomicroscope and digitally-recorded with a camera is called shrinkage activity and has been defined by a sequence of five temperature intervals. The intrinsic main limitations of this method, i.e. time consuming and human eye assessment variability causing high errors and making it impossible the inter-laboratory comparison, can be overcome by the use of image processing techniques for the automatic detection of shrinkage intervals. An improved MHT method incorporating image analysis will deliver a really objective and faster analytical technique and enable for effective diagnosis and conservation decision in museums, archives, libraries, public and private galleries.

Keywords: historical parchment and leather, shrinkage, Σ-Δ filtering

FREQUENT RETURNS TO ETHNIC GROUNDS IN FASHION DESIGN

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As part of the history and civilization of the Romanian people, the Traditional costume constitutes a living document which lasted for centuries and sent to the generations the message of an authentic artistic creation. The folk costume is a precious artistic document, social and historical. The Traditional Romanian costume is a continuous source of inspiration in fashion design. The analysis of these forms of cultural expression supports the conclusion, according to which the reuse of these decorative motifs can create products with a great effect in contemporary fashion. It is obvious, in this context, the importance of the source of inspiration, but also the presence of a relevant manner of reapplication and reinvention of these elements. Although the contemporary designers are working in accordance with a vision, appealing to a wide area of styles and methods using current technology, cyclical they return to traditional techniques and ethnic folklore motifs, which converts and resize them, integrating them in their contemporary space. In terms of product design, is very important tot take into account some intrinsic elements of the creative process, such as trends and artistic values present in traditions, customs, crafts and design. The current research in fashion related to national folklore motifs developed by INCDTP is to define the anthropometric characteristics of the population and the ethnographic features of the folk costumes from different regions of the country and use it as a source of inspiration for the fashion collections.

Keywords: fashion, Romanian costume, inspirational source

HUMANISTIC EPISTEME IN SUSTAINABLE DEVELOPMENT OF CREATIVE INDUSTRIES

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Sustainability is based on the requirement to make all economic systems less dependent on resource use and to make products last longer, thus requiring a slowdown of serialization, production and consumption and an increase in the added value and customization of products. This can be done by building a cultural paradigm with different rates of application and development,

and transfer the entire arsenal of tools, processes and creative productions to the creative and cultural industries. In this context it becomes important to formulate the humanistic episteme of sustainability of creative industries, as it is the fundament of any concept in fashion, design, advertising, media, etc. This step is an obvious one because creative industries are not manufacturing or construction industries, but conceptual industries that are defined by the prior existence of a practice and history of knowledge and creation. The paper aims to outline a sketch of humanistic episteme in the sustainable development of the creative industries, with the example of the fashion industry, this theory proving to be a milestone in effectively structuring the culture of an office of style or design, because style offices are nothing but small industrial research centers, without which independent production companies cannot operate.

Keywords: humanities, episteme, sustainability, creative industries, fashion industry

UNILATERAL NMR FOR DAMAGE ASSESSMENT OF VEGETABLE-TANNED LEATHER. CORRELATION WITH HYDROTHERMAL PROPERTIES

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Unilateral NMR has proven to be a valuable tool in the field of collagen-based cultural heritage where non-destructive analyses are highly demanded. Old leather is a collagen-based biomaterial made from animal hides chemically treated by vegetable or mineral tanning to increase chemical and physical durability and confer desired handling and working characteristics. In this study unilateral Nuclear Magnetic Resonance (NMR) combined with shrinkage temperature measurement by the Micro Hot Table (MHT) method were applied to evaluate the conformational, structural and stability changes of variously vegetable tanned leathers exposed to accelerated ageing by heating at 70 °C in controlled atmosphere at 30% relative humidity (RH) and irradiated with 4000 lx in the visible light region for 8, 16, 32 and 64 days. Longitudinal relaxation time T1 values, measured by NMR MOUSE portable equipment using a saturation recovery sequence, showed specific variations depending on both animal species and tanning agent, and ageing time. Collagen fibres' shrinkage temperature Ts values evaluated using the home made MHT equipment available at INCDTP-ICPI, Bucharest, complemented the hydrothermal information on fibre level.

Keywords: Vegetable tanned leathers, NMR-MOUSE, MHT method.

RADIORESISTANCE OF BIODEGRADATION FUNGI AND ITS IMPORTANCE IN ESTABLISHING THE DECONTAMINATION DOSE

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The decontamination and preservation of artifacts from natural materials like paper, parchment, leather, textile, etc. is a continuous struggle against their colonization with bacteria, fungi or insects. Decontamination of cultural heritage objects by gamma radiation is a better alternative to chemical disinfection. Optimal decontamination dose selection is challenging. For this, the nature of the objects, the bioburden and the radioresistance of the contaminant microbial communities should be considered. Also, when establishing the radioresistance of a microorganism, some physical factors (irradiation support, storage temperature before irradiation) should be considered. These factors, especially the water content, influence the radioresistance, expressed as D10 value. Studies on Aspergillus niger and Trichoderma viride, which are common moulds that colonize and attack a wide range of artifacts, were carried out. The range of D10 value, influenced by the factors mentioned above, was studied. The focus of the study was the isolation of microorganisms from cultural heritage artifacts and their characterization regarding the radioresistance which further represents one of the preliminary steps in preservation/ restoration of cultural heritage artifacts.

Keywords: D10 value, radioresistance, fungi

TESTING OF ARTIFICIALLY AGED LEATHER IN ACID RAIN

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To assess the resistance of calf leather tanned with quebracho to acid rain, the changes in shrinkage temperature, melting temperature and enthalpy of crystalline zone, and contact angle of a liquid drop as artificially aging in acid rain were determined. Acid air aging of leather was revealed to bring about the weak decrease of shrinkage temperature, melting temperature and absolute value for enthalpy of leather crystalline zone. On the other hand, there is not a significant difference between values of contact angle of initial and aged samples. All these results show that the investigated leather exhibits a good resistance to acid rain.

Keywords: leather, artificial aging, acid rain.

VI.
INNOVATION

A MODERN APPLICATION FOR CUSTOMIZED FOOTWEAR DESIGN

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The aim of this article is to present a modern application for customized footwear design using MindCAD software. These CAD systems are the next generation of design solutions and engineering for the footwear industry. Designed entirely for use with modern operating systems and environments, it provides a full range of instruments, intuitive and easy to use. 3D computer aided design techniques (3D CAD) enables direct modelling of footwear on the last, so even before the product is fabricated, it can be analysed in terms of visual, functional, industrial and financial criteria. Starting with a shoe last (digitized, scanned or from database), it can quickly be designed a complete footwear model, in any colour or material combination. The result is a 3D realistic view of the product, ideal for presenting it to the buyers, customers or producers.

Keywords: computer aided-design, shoe last, footwear design, 3D modelling

INNOVA-LEATHER - INNOVATIVE TECHNOLOGIES FOR LEATHER SECTOR

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Leather industry has to cope nowadays with major environmental problems because of the polluting processes (a World Bank report has placed the leather industry in the ninth place when considering the environmental impact). Therefore, increasing the environmental efficiency in the leather sector is the major aim of leather, auxiliary materials and equipment manufacturers. The development of new tanning agents and new technologies is required to cope with the increasingly higher environmental pressure on the current tanning materials and processes such as tanning with chromium salts. This paper presents the main results obtained in the framework of INNOVA PROJECT. The original contribution of this project in solving the above problems has involved the use of solid titanium wastes (cuttings) resulting from the process of obtaining highly pure titanium (ingots) in the preparation of new tanning compounds intended to increase the environmental efficiency of the leather sector. Also, is within the above line, aiming to obtain wet-white leather by an organic tanning process in order to reduce chromium in tannery effluent. Other main objective of the project is valorization of wet white leather waste as raw material for obtaining new biodegradable auxiliaries with application in agriculture, cosmetics, industry.

Keywords: tanning agents, wet white, FOC leather, waste valorization, cosmetics, soil remediation, sustainable development

PROCEDURAL ASPECTS ON THE APPLICATION MAINTENANCE CONCEPT BASED RISK AND RELIABILITY CENTERED IN THE CASE ASSESSMENT STRUCTURAL INTEGRITY OF EQUIPMENTS FOR INDUSTRIAL PROCESSES

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The essential aspects are presented and discussed specific application of the national concept of risk based maintenance (*RBM*), focused on reliability (*RCM*) and focus on the performance of equipments and facilities in the process industries. Currently, this type of maintenance is one of the most modern and innovative conceptual models which is based on control, monitoring and risk based inspection (*RBI*) and using a specific application procedure with great benefits and superior performance on improving the safety, integrity structural reliability of equipment and industrial installations and reduce costs by eliminating operations diagnostics, control, monitoring and inspections ineffective and increasing the availability of basic technical equipment.

Keywords: risk of failure, matrix of risk, structural integrity.

ENHANCING THE ECO-INNOVATION CONCEPT IN LEATHER INDUSTRY BY CAPITALIZING THE PROCESS MODELING THINKING

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The increasing peace of globalization and the high growth of consumerism have created a significant pressure on leather tanning sectors to reduce the environmental burdens envisage by conversing the raw materials into leather. The modernization of the leather producers counted for the concerns of environmental protection, waste reduction, recycling and recuperation of secondary raw materials. The paper takes an interdisciplinary view on how the business engineering thinking leverages the enhancement of the sustainable development and the growing recognition the eco-industry and the green growth. Consequently, it has applied the process modeling thinking on the air pollution measurement process with the aid of the business process modeling notation – BPMN, since this process represents a key concern for most of the leather and footwear manufacturers. The results capture the workflow of the air pollution measurement process, and also data about the steps in the process which can be used for process improvements based on what-if analysis. Using the BPMN diagraming technique to map out flows and process relationships is facilitated the process understanding that help document and communicate to all parties involved how the process should be performed. Finally, the findings illustrate the benefits of the process modeling thinking in modernization the activities related to environmental protection goals from the leather sector. By designing, adopting, and leveraging process models for environmental protection, the manufacturers of leather and leather products are stimulating the sustainable development, and also the concept of eco-efficiency and eco-industry.

Keywords: business engineering, process modeling, eco-industry.

IMPLEMENTATION OF INNOVATION POLICIES THROUGH RESEARCH AND DEVELOPMENT PROJECTS

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This paper analyses types of policy instruments responsible for the success of policy implementation through projects. Based on comparative case studies, the paper provides an analytical perspective from real practice about how and why various types of instruments lead to either successful or unsuccessful projects. Particularly, the key finding is that, in order for projects to implement successful policies, policy instruments must be designed based on composite thought systems related to flexibility. Results provide the key direction, but without the holistic conceptual component of developing the implementation theory, which needs to go beyond conceptual fragmentation and polarization.

Keywords: innovation policy, implementation instruments, thought systems, innovation projects, flexibility

DESIGN AND STYLING – CONTEMPORARY INTERESTS IN HAUTE-COUTURE ACCESSORY FASHION

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Fashion is a symbol. Clothes and accessories are a clue for the social, professional or cultural group an individual is part of. This separation is visible especially among youngsters, who dress according to their favourite music, choosing idols from the popular stars. Starting from the connotation of the graphic symbol, haute-couture product design designates a mental plan, a project, an outline or a sketch, a basic drawing or a model for a work transposed into various materials and aesthetic dimensions, an implication and motivation in individual styling. The relationship between design and styling is really a response of the customised product, meeting an emotional need, leading to stylistic harmonisation and a conception governed by the logic of things. Each individual has a personal style through his aesthetic presence. This style must be harmonised with the design of the products he wears. The style that is an expression of useful objects emerges from their aesthetic shapes, characteristic to a particular period.

Keywords: fashion, symbol, design, styling, aesthetics, customised product.

DESIGN INNOVATIONS ON FOOTWEAR FOR OVERWEIGHT/OBESE PEOPLE

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The overweight/obese population is aggressively growing worldwide due to laxity on physical fitness, sedentary lifestyle and eating habits. The obese individuals, in general, experience instability during locomotion and they are towards the direction of rapid development of musculoskeletal disorders, pain symptoms on the regions like heel, ankle and plantar surface of the foot. The main objective of Design innovation concept is to evolve varied angles particularly on the heel region of footwear to relieve pain and stress posed by obese people. The comfort solution has been attempted pragmatically through adaptation of innovative research in this paper. In the developmental process, the design modifications externally on the heel regions with the varied angles 20 degree, 30 degree and 40 degree have been designed. The slip resistance tester is employed for the estimation of Coefficient of friction between the sole surface and floor surface. The results revealed that the externally designed shoes represented with improved values of Coefficient of friction while compared with standard shoe. The design innovation concepts have resulted in higher coefficient of friction values on the externally modified footwear and the newly designed footwear is referred as an ideal remedy to acquire therapeutic advantages and benefits for overweight/obese individuals.

Keywords: obesity, friction, design innovation

CREATIVE TRANSFER OF COMPETENCE IN 3D FOOTWEAR CAD

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The Creative Transfer of Competence in 3D Footwear CAD to VET Professionals Project, acronym - INGA 3D, aims to transfer and extend innovative software solutions and 3D technologies for computer-aided footwear design. The project brings together universities, research and training centres, adult education providers and IT companies from four European countries. The project products will introduce innovative solutions for e- learning in order to test and to validate new teaching methodologies and approaches suitable for vocational training in footwear computer-aided design. It will contribute to developing skills and competencies of VET professionals in order to face with the future challenges.

Keywords: footwear CAD, vocational training, virtual environment, practical and theoretical knowledge.

DEMOULTRAGRIP - OPPORTUNITY TO DEVELOP NEW PRODUCTS FOR THE FOOTWEAR INDUSTRY

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The structure of production units in the Romanian footwear manufacturing industry demonstrates the existence of a production system based on SMEs, 97.1% of companies having less than 250 employees. The design criteria for models currently used by anti-slip footwear sole manufacturers are empirical, often based on intuition and previous experience. The technical problem is the lack of design tools that can be used in the design of shoe models, mainly the footwear's soles, in terms of making a prototype faster and at lower costs, while being more effective in creating an adequate response to the friction between footwear and walking surface during use. With DEMOULTRAGRIP project, the involved shoe manufacturing SMEs will gain a competitive advantage based on the use of new design tools for creating products with high resistance to sliding, speeding the design-prototyping operation, reducing prototyping and production cost, improving the anti-slip properties of products and reducing time-to-market.

Keywords: soles, rapid prototyping, friction coefficient

RESEARCH REGARDING ESD GARMENTS DEVELOPMENT

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The electrostatic discharge (ESD) can be defined as a sudden transfer of electrostatic charge between two objects of different potentials. In terms of ESD characteristics, fabrics will quickly dissipate the accumulated charge, but will present a potential risk for electrostatic charging and energy transfer during an accidental discharge; these issues are solved by the fabrics that contain surface conductive fibres. To obtain an ESD garment with superior qualities, the present paper proposes the study of a double layered knitted structure. The fabric were manufacture on a electronic flatbed knitting machine, and tested from the functional characteristics point of view (electrical resistance, shielding factor, discharge time) and from the comfort characteristics point of view (thermal conductivity, thermal resistance, air and vapour permeability).

Keywords: electrical discharge, knitting, protective clothing

VII.
QUALITY MANAGEMENT AND COMPETITIVENESS

CO_2 EMISSIONS REDUCTION FROM TANNERIES AND FOOTWEAR MANUFACTURE INDUSTRY FROM ROMANIA. REALITIES AND TENDENCIES

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This paper is presenting the objectives and partial results of the project IEE / 11 / 949 / SI2 615946 IND-ECO which is running under the Intelligent Energy Europe – Executive Agency for Competitiveness and Innovation EACI umbrella. A number of 16 entities representing leather and footwear European and national employers' associations, manufacturers, research institutes from Italy, Belgium, UK, Spain, Portugal, Romania and Bulgaria has formed a consortium with the purpose of reducing energy consumption and CO_2 emissions at the level of EU countries.

Keywords: energy efficiency, tannery, footwear

QUALITY IMPROVEMENT IN THE FOOTWEAR COMPANY

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Quality is the key factor in ensuring the competitiveness of an enterprise. In the footwear industry of Moldova there are about 50 enterprises producing shoes for both internal and external market mainly in the LOHN system. This paper shows the results of the case study regarding some aspects related to the footwear quality production at the "Zorile" S.A. based on analysis of data recorded at the final inspection. The Pareto and Ishikawa charts are tools that facilitate analysis and enable the elaboration of offers to improve the existing situation. Based on the actual situation of the footwear quality in the enterprise it is recommended improve the quality of processes and products through the implementation of actions aimed to remove the underlying causes identified and relate to: professional training of workers provided by the employment of graduates and the organization of continuous training; staff motivation by increasing their remuneration accounted from salary supplements for the quality and ensuring the professional growth, organizing the activities in such a way that the employee be able to meet the standard of work produced by staff to improve recognition of the company in terms of continuous improvement quality; revision of the rules of time; organizing activities to prevent occurrence of nonconformities by continuous ensuring with materials needed for technological operations; implementation of new technologies that would require organic substances, total or partial mechanization; providing a favorable work environment, proper lighting, ventilation, workplace policy, workplace convenience.

Keywords: footwear, quality, defects.

EU POLICY FOR SUSTAINABLE CONSUMPTION AND PRODUCTION – ECOLABEL FOR FOOTWEAR

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The EU Ecolabel is a voluntary scheme that forms part of overall EU policy to encourage more sustainable consumption and production. The award of an EU Ecolabel to a product is denoted by use of the logo „Flower". This paper provides a brief overview about EU Ecolabels with special emphasis on EU Ecolabel for footwear product group, criteria for a first assessment only and a short description of the global and European leather footwear industry.

Keywords: Ecolabel, footwear, sustainable development, sustainable consumption

NEW APPROACH RELATED TO THE EMERGING RISKS GENERATED IN THE OCCUPATIONAL ENVIRONMENT IN THE PROCESS INDUSTRIES

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Working environments are continuosly changing under the influence of new technologies and of shifting economic, social and demografic conditions. In this context, the Community strategy on health and safety at work called on the European Agency for Safety and Health at Work to set up an European Risk Observatory to anticipate emerging risks (any risks that are both new and increasing) in the world of work, in order to ensure high levels of safety and health at work The emerging risks were identified by means of the Delphi method. (that is based on an iteration process in which the results of the previous rounds are fed back to the experts for new evaluation). The experts invited to participate in this survey covered 27 European country and the USA. The „top" emerging risks agreed by experts in the process industries are nanoparticles, diesel exhaust, epoxy resins and isocyanates, vibrations, thermal discomfort, new technologies (complex human-machine interfaces, automation), repetitive work, new/ precarious forms of employment contract, job insecurity, work intensification and outsourcing. European Risk Observatory focus on emerging risks in order to ensure, in the future, a high level of safety and health at work.

Keywords: emerging risks, industry.

THE IMPORTANCE OF TURKISH LEATHER SECTOR IN EUROPEAN UNION MARKET FOR RAW AND FINISHED LEATHER

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Because the effects of globalization and intense competition are deeply felt nowadays, the businesses which want to maintain their existence, expand into foreign markets and increase their participation in the international activities. The internationalization process and the assessment of the factors affecting this process have great importance for the businesses with this thought. In 2013, the world economy generally showed a yield below the average. Throughout the year, the growth rate of developing countries has been a slowdown while the economies of developed countries were slowly recovering. European Union (EU) consisting of 28 member countries met in order to keep peace and to stand economic and social improvement has become a big power. Trade realized with the EU countries is very important for the leather sector which is one of the leading sectors of Turkish Economy and also has a very important share in the economy. When considering that the intensity of foreign trade with EU countries is based on Customs Integration, it should be noted that the EU norms will be the reference for the sector exporters. When we have a look at the foreign trade of Turkish leather sector in terms of the export and also import values, it can be easily seen that the trade with EU countries is very extensive. The EU countries with the features of higher income per person and being open to consumption, is the market where is held 33.9 % of our total leather exports. It is a very important market for Turkish leather sector. However, in such a large market, a number of criteria that need to be considered should not be ignored. In this study, the EU share of Turkish leather sector in recent years is investigated. However, Turkey – EU relations in terms of Turkish leather sector are examined, export and import data of the sector are also considered by years and listed among EU member countries. In the last part of the study, The problems experienced with EU on foreign trade and the criteria which should be taken into consideration, are stated.

Keywords: European Union, leather and leather products, export-import.

A THEORETICAL INSIGHT INTO THE BUSINESS PROCESSES FRAMEWORK

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The recent years have brought a plenty of researches and knowledge in the field of business process management as an effect to the interest on understanding and managing the enterprise functioning. Due to the growing importance of digital era and IT advance, enterprises striving to achieve competitive advantage are required to elaborate a common understanding of working environment by configuring their business processes. The paper aims to explore the core concepts embedded in the two well established frameworks for business processes: BABOK Guide (Business Analysis Body of Knowledge) and ISO 9001:2008 standard. The research methodology was consisted of a literature review on today's enterprise processes architecture that helps understand and organize knowledge about business processes models, followed by a comparative analysis of the frameworks chosen, from different views. The results capture the key differences and similarities between the frameworks and highlight the limitation of the BABOK Guide compared to ISO 9001:2008, with respect to business processes framework. However, regardless of the architecture, the business processes framework enables the development of the coordination mechanism of the

processes relationships, diminishing the variance of input and output values with significant improvements on the predictability of process behavior. Finally, the authors share their view on how business processes framework is becoming a cutting-edge vehicle toward achieving the enterprise excellence, gaining thus the competitive advantages.

Keywords: business process management, business analysis, competitiveness.

ANALYSIS OF ERRORS IN THE MANUFACTURING USING DESIGN FOR SIX SIGMA. (DFSS)

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This paper uses the results of research in the field of automotive, manufacturing line process optimization. Achieving quality components with documentation, in line with the conditions of a large series and mass production, generates the need for an optimization process at a global level (logistics, manufacturing, assembly, sales), depending on the components 'magic triangle' quality costs and time. Simultaneously, an improvement (downwards) the error rate towards achieving manufacturing - assembly lines of robust products generates an improvement in the net value of production, an increase in the competitiveness of the company by increasing production capacity, labor productivity and delivery terms. DFSS is considered a way to improve the training process of product components, by diminishing the number of defects. It aims to improve the management of specific aspects of manufacture, reducing manufacturing risk by avoiding the use of bad or defective components, from the design stage of the process. DFSS was used to analyze the structure of functions of electronic parking brake fitted to the car (Electronic Parking Brake - EPB); model was used for analysis V or "cascade" each come with the design, to avoid errors, and especially to the structuring tasks, functions of each component in the system structure. DFSS implementation stages followed DICOV circle (Definition, Identification, Characterization, Optimization, Validation).

Keywords: functions of product, continuous improvement components, magic triangle, the car's electronic parking brake (EPB)

ASPECTS OF RISK MANAGEMENT AT COMPANY LEVEL

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Companies belonging to the former communist states, when accessing a European or global market, a risk factor collides. It appears unexpectedly where you are not expecting! If the management team does not have information about the possibility of risk, at any time, in any form, it can not take effective measures to eliminate the risk. Consequently, the additional costs resulting from the planned reduction benefit. Programs developed by the companies highlighted, particularly in the last decade, the need for protection against business risk. These programs will include elements of risk management; they can be considered risk management tools, as in applications, the value resulting from the process must exceed the costs of it. The increasing complexity of business, changes in market and financial uncertainties in some markets (such as energy market, grain market, commodity market, the IT market) requires an increased awareness of the risk factor in time, and thus increase the need and importance of the Chief-Risk-Officers in the company. It is presence throughout the program creates the premises highlighting, synthesizing and undertaking risk to optimize the trials themselves. Overall analysis of how financial risk arises, the company points out that now must shift from an approach to the economy that seeks certainty and eliminating risks to accept uncertainty and risk taking as a contempt of uncertainty and that philosophy to stimulate progress.

Keywords: risk, Chief Risk Officiers, business risk.

ADAPTIVE MULTI-AGENT CONTROL OF LEATHER MANUFACTURING PROCESSES BY USING SMITH PREDICTOR

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The conventional control systems used in leather manufacturing proven their inefficiency due to their centralized architecture, being a critical point of failure that impose operational bottleneck. Multi-agent systems (MAS) represent a viable alternative for

making a system agile, providing flexibility and modular development of the control system. A MAS represents a more natural way in dealing with complex distributed problems due to their characteristics autonomy, social ability, mobility, modular development. Agents part of the MAS are distributed geographically and communicate one with another via a network. Each node of the network is represented by an agent that represents a manufacturing resource. Communication between agents generates delays that can affect functionality of the system. This paper presents an adaptive multi-agent control system used on leather manufacturing processes which is based on Smith predictor. The proposed adaptive control strategy based on Smith predictor aims to eliminate the negative effects generated by communication delays between agents on production system performance. Communication delays are modeled as pure delay elements. The proposed control strategy has an estimator for the communication delays and these estimates are used to adjust the controller, specifically to adapt its parameters to the new values of communication delays. Simulation results are presented and they demonstrate the performance improvement when the proposed control strategy is used.

Keywords: leather industry, agent architecture, smith predictor, multi-agent systems, leather manufacturing.

ENERGY EFFICIENCY THROUGH MULTI-AGENTS ADAPTIVE MICROMANAGEMENT

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Finding successful ways to reduce the energy utilization in commercial and residential buildings is of paramount importance in lowering CO_2 emissions and achieving the Kyoto Protocol commitments on climate change. Indoors energy consumption account for roughly 40% in US and EU. Building exploitation are linked to about 36% of the total CO2 footprint. The main approach to ameliorate this situation is to enhanced energy efficiency, decrease the overall consumption and switch to renewable, carbon-free energy sources. In the field of energy efficiency, enhancement of load control and adaptive demand response at every point of consumption are part of the solution. This paper presents the problematic and limits of energy consumption savings while accommodating human comfort propensity. Further we present the simulation results for a grid of independent, autonomous, collaborative agents that continuously monitor human activity in a closed environment and override the user configured comfort preferences towards a default optimum performance/cost whenever the changes do not affect the user experience. In order to better highlight the importance of local micromanagement and to obtain the best approximated average performance, the chosen simulation environment was a 250 rooms hotelier resort and targeted the heating/cooling annual energy cost with human behavior stochastic considerations.

Keywords: multi-agents, energy efficiency, intelligent buildings.

COMPETITIVENESS MANAGEMENT OF LEATHER COMPANIES: A CLUSTER APPROACH

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Manager's efforts aimed at developing efficient organizational forms of business, including clusters. Specified economic phenomenon can be identified as the structure of the vertically and horizontally linked by economic agents (companies, research and educational institutions, government agencies) in a particular industry and allied sectors. Their essential feature is the ability to complement and enhance the competitiveness of each other and the region as a whole. In this case principal in the identification of clusters is their ability to generate positive synergies from coordinated behavior and internal communications. Within the pale of the cluster mainly such forms of synergy find a manifestation, as synergies of scale, labor, sales, investment management, environment and operational synergies. Assessment of Ukraine leather companies regarding opportunities for cluster synergy cooperation was carried out by us in the following segments: manufacturing; logistics; sales; marketing; research and experimental development; exchange of information; communication with consumers. It is shown that the formation of cluster networks provides increasing competitiveness of companies by reducing logistics costs and marketing, accelerate innovation and by stimulating the exchange of knowledge and skills.

Keywords: competitiveness, cluster, positive synergies.

THE EVOLUTION OF PRODUCTIVITY FACTORS IN THE ROMANIAN MANUFACTURING: AN ANALYSIS OF THE TEXTILE, CLOTHING AND LEATHER SECTOR

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The three pillars of productivity are new technologies, capital and labour. Observation of data of the economy shows that positive developments in some sectors are based excessively on labour and capital accumulated and less on new investments and capitalization of R & D results. Using the correlation method aims to identify the factors which ensured industrial output growth during 2000-2012. The application takes place in the textile, clothing and leather.

Keywords: productivity, indicators, textile

QUALITY ASSESSMENT OF LEATHER PRODUCTS USING THE METHOD OF ABSOLUTE VALUE PARAMETERS

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In the last two decades, the development of leather goods industry, rom the point of view of sustainability, was characterized by emphasizing the two groups of the relevant parameters: (1) Development of production volumes, from the point of view of the assortment, of product quality, the areas of sales, but also in terms of quantities produced; (2) Development of new technologies, capable of providing, in real-time, and in the quantities required by the market, products at a quality level according to customer requirements. As a result of the above, in the quality evaluation of skin products, it is necessary to develop a generally quality index, to consider themselves not only the quality of the finished product, but also aspects of quality product manufacturing process parameters finished. From the set of these parameters, some can be quantified numerically, others do not. This paper aims to develop a methodology for calculating the Synthetic Quality Index (SQI) for leather products, taking into account the effects of manufacturing parameters on the quality of the finished product. All these values will be reported in nominal quality requirements accepted.

Keywords: synthetic quality index, quality characteristics, coefficient of importance.