Contents

BIODEGRADABLE BLENDS BASED ON PHB AND WOOD FIBER

Mihai DIMONIE, Maria RÂPĂ

Five recipes based on poly-3(hydroxybutyrate) (PHB), wood fiber (WF) and epoxidated soy-bean oil (LSA) were prepared by Brabender Plastograf, at 170 0C. It was found that with increasing wood fibers content in the PHB matrix, the tensile strength and the melting temperature decrease, due to the poor compatibility between the two phases. The optical microscopy performed support the findings of tensile strength test. Under soil, the blends indicated that the weight loss is higher with the increase of the wood fibers content.

Keywords: biodegradation, poly(3-hydroxybutyric acid); wood fiber, plastic blend

SOLID-PHASE SUPPORTED CHIRAL TRICARBONYL-CHROMIUM COMPLEXES

Matei D. RAICOPOL, Roxana LEHĂDUŞ, Cristina OTT, Raluca STAN, Sorin I. ROŞCA

We disclose the synthesis of some organometallic polymers containing arene-tricarbonyl-chromium complexes. Several approaches were used for this purpose, such as ligand exchange and grafting by electrophilic aromatic substitution with benzylic carbocations stabilized by tricarbonylchromium groups. These polymers can be used as chiral solid-phase supported catalysts.

Keywords: solid-phase supported catalysts, tricarbonylchromium complexes

ENZIMES IN COTTON BIO-SCOURING

Michaela Dina STĂNESCU, Mihaela DOCHIA, Magdalena FOGORAŞI, Monica PUSTIANU, Mircea Sorin BUCUR

The demand for new ecological technology lately enhanced, due to the strict environmental regulations introduced. Textile processes are characterized by high pollution, generated by the large amount of waste waters with acid or alkaline pH. Thus, the application of enzymatic work-up procedures seems of great interest.

Attempt to replace the alkaline scouring of cotton with an enzymatic procedure is described. The importance of auxiliaries for obtaining good results is underlined. The properties of the treated cotton are discussed in comparison with the classical treated material.

Keywords: cotton, pectinase, bio-scouring, surfactant, complexing agent, clean technology

ELECTROCHEMICAL STUDIES ON SOME INDOLIZINE CARBOXYLATES WITH POTENTIAL APPLICATION

Maria-Laura SOARE, Magdalena Rodica BUJDUVEANU, Eleonora-Mihaela UNGUREANU, Emilian GEORGESCU

This work is devoted to the electrochemical study of ethyl 3-(4-methylbenzoyl) indolizine-1-carboxylate and ethyl 3-[(2-ethylphenyl)carbamoyl] indolizine-1-carboxylate by cyclic voltammetry (CV) and differential pulse voltammetry (DPV). There are established the number and characteristics of the redox processes for each compound. Comparison of the electrochemical parameters was connected to the difference between the effects of the functional groups grafted on the indolizinic ring.

Keywords: ethyl 3-(4-methylbenzoyl) indolizine-1-carboxylate, ethyl 3-[(2-ethylphenyl)carbamoyl] indolizine-1-carboxylate, cyclic voltammetry, differential pulse voltammetry

ENVIRONMENTAL ASSESSMENT OF CITRIC ACID PRODUCTION

Anca NICA, Alexandru WOINAROSCHY

Citric acid is traditionally produced using the filamentous fungus Aspergillus Niger. One advantage of Aspergillus Niger is its ability of fermenting substrates which come as waste products from other process. The use of whey as carbon source is very attractive because this raw material is cheap. In this work is presented an original investigation on the environmental assessment of the industrial process of citric acid production using whey. The corresponding results are confronted with an alternative process of citric acid production using starch. The corresponding environmental assessments are realized using the practical method proposed by Biwer and Heinzle.

Keywords: environmental assessment, citric acid, Aspergillus niger, zer, amidon

GC/MS STUDIES ON ALCOHOL DERIVATIZATION PROCEDURES APPLIED TO LEWISITE 1 DUE TO THE INCREASED INSTABILITY OF SOME ETHERS

Gabriel EPURE, Nicoleta GRIGORIU, Laurenţiu FILIPESCU

2-Chlorovinylarsine dichloride (Lewisite 1) identification by gas chromatography is not a simple analysis, because it requires high concentration levels in sample (several mg/ml), very clean systems with new columns, a specially prepared injection port liner and on-column injection. Moreover, derivatization is highly demanded for reliable analysis. Lewisite 1 reacts quickly with alcohols at room temperature, producing the corresponding 2-Chlorovinylarsine chloridether and bisether to equilibrium. The reactions are not quantitative, due to the instability of ethers resulted from the reaction with lower alcohols.. The reaction products with C5 – C8 alcohols were stable and identified by mass spectrometry.

Keywords: Chemical Weapons Convention; Lewisite 1, derivatization; ethers

A STUDY REGARDING THE SURFACE PROPERTIES OF RUBBERS-BASED ADHESIVE ASSEMBLIES

Dan Liviu IOAN, Ioana DUŞESCU, Cătălin ZAHARIA, Gheorghe HUBCĂ

In this paper, based on the experimental data of surface tension of rubber solutions and contact angle, the values of some parameters involved in adhesion process, as solid-liquid surface tension, work of wetting, work of adhesion, superficial concentration and surface area occupied by an elastomer macromolecule were computed and interpreted. The investigated adhesive solutions contained natural rubber, polychloroprene rubber and nitrile butadiene rubber dissolved in appropriate organic solvents (gasoline, toluene and methyl-ethyl-ketone, respectively) in concentration range of 12-25 wt. %.

Keywords: adhesive solutions, surface tension, natural rubber, polychloroprene rubber, nitrile butadiene rubber

MICROSTRUCTURE OF PARTIALLY HYDROLYZED POLYVINYL ALCOHOLS USED IN PVC-S TECHNOLOGY

Radu N. OLARU, Dumitru Mircea VULUGA, Florentina GEORGESCU, Daniela MARINESCU, Mihai DIMONIE

The paper presents a comparative investigation on the microstructure of different partially hydrolysed polyvinyl alcohols used in PVC-S technology. Average acetate-containing sequence length and their distribution in partially hydrolyzed polyvinyl alcohols as well as their "blockiness" have been investigated via 1H-NMR of polyvinyl alcohols and UV spectra of polyvinyl alcohol-iodine complexes. For alkaline partially hydrolysed polyvinyl alcohols a linear correlation of blockiness (UV) with blockiness index (NMR) was found.

Keywords: polyvinyl alcohols, vinyl alcohol-vinyl acetate copolymers, sequence length, polyvinyl alcohol-iodine complexes UV spectra, polyvinyl alcohol ^{1}H-NMR spectra

HYDRODYNAMIC ASPECTS OF FLUIDIZED BED STABILIZED IN MAGNETIC FIELD

Alina-Violeta URSU, Ileana Denisa NISTOR, Fabrice GROS, Alisa Vasilica ARUŞ, Gabriela ISOPENCU, Alina Monica MAREŞ

The paper studies the hydrodynamic of the gas/solid fluidization in a transverse magnetic field of ferromagnetic particles (commercial steel). The influence of solid (magnetic and non-magnetic particles) characteristics, and the magnetic field intensity (in the range of 0-12000 A.m-1), on the pressure drop and porosity of the granulated bed has been investigated. The results confirm that the magnetic field intensity has a large influence on the stability of magnetic particles in a mono-component bed.

Keywords: hydrodynamic of magnetic particles, magnetic field intensity

REMOVAL CHROMIUM POLLUTION FROM LEATHER INDUSTRIES WASTES

Mihaela NICULESCU, Aura Dana IONIȚĂ, Laurențiu Filipescu

Sludge and waste waters carrying chromium compounds are embarrassing environmental burdens for the both tanning and leather processing industries, as well as for many other manufacture branches involving extraction and use of the chromium chemicals. This paper approaches the chromium removal from waste waters and sludge by two pathways designed to produce a chemical stable material incorporating the waste chromium for landfilling as non-hazardous waste. First pathway involves the chemical reaction and sorbtion on treated red mud, which results in the separation of chromium hydroxide bound in inert compounds. Second pathway concerns in situ precipitation of aluminum and magnesium phosphate as adsorbents of chromium hydroxide in their crystalline lattice.

Keywords: chrome leather, red mud, chromium, adsorption, levigability

STRUCTURAL CHARACTERIZATION OF CHITOSAN COATED SILICON NANOPARTICLES –A FT-IR APPROACH

Mirela DIACONU, Andreia TACHE, Sandra Ana-Maria Victoria EREMIA, Florentina GATEA, Simona LITESCU, Gabriel Lucian RADU

This paper presents our experimental results on the bio-functionalization of silicon nanoparticles (SiNP) with a polymer, chitosan. The procedure consists of two steps and it was developed in order to bind efficiently and effectively chitosan biopolymer to the silicon nanoparticles surface. Using triethoxsilylbutyraldehyde, a silane compound possessing terminal carboxyl functional group instead of other known silanes, has reduced the time required to attach the desired coating. FT-IR analysis performed on chitosan coated SiNP samples has proved the presence of – NH_2 *and –OH functional groups on their surface, available for further attachment of some drugs used in cancer therapy. The attached chitosan biopolymer film has maintained its native structure, therefore preserving its biocompatibility properties.*

Keywords: silicon nanoparticles, biofunctionalization, chitosan biopolymer coating, Triethoxsilylbutyraldehyde, structural analysis

THRESHOLDED OPERATING PARAMETERS IMPACT UPON THE BIOLOGICAL WASTEWATER TREATMENT FACILITY

Mirela STOENICĂ, Vasile LAVRIC

The recycle and purge ratios are responsible for the two of the main time scales of the wastewater treatment facility, the residence time of the biological reactors, and the doubling time of the microorganisms accountable for the biodegradation of substrates. The effects of threshold imposed to the recirculation and purge flows upon the performance of a biological treatment process for wastewater are investigated in this study. The presence of the threshold is important, affecting significantly the behavior and, consequently, the performance of the system, with respect to the biological process and to accidental release of pollutants into environment.

Keywords: threshold, recycle ratio, purge ratio, time scale, wastewater treatment process, bioreactor, cumulative conversion

MICROBIAL PRODUCTS AS NATURAL ALTERNATIVE TO FERTILISERS: ISOLATION AND CHARACTERISATION OF NITROGEN FIXING BACTERIA

Éva TAMÁS, Gyöngyvér MARA, Éva LASLO, Éva GYÖRGY, István MÁTHÉ, Beáta ÁBRAHÁM, Szabolcs LÁNYI

The nitrogen fixing bacteria have stimulating effect on the plant, they are able to fix the nitrogen in symbiosis with leguminous plants using the nitrogenase enzyme complex[14]. The isolation of the strains was made from the soil on selective media, and the strains were characterised through colony morphology analysis (form, elevation, margin, appearance, optical property, pigmentation, texture) and cellular morphology. For the genetically characterizations we have used restriction fragment length polymorphism (RFLP) of the 16S rRNA gene [9,10]. The differences in the rRNA region were mapped using TaqI, HaeIII and ApaI restriction enzymes[17].

Keywords: nitrogen fixing rhizobacteria, rhisosphere, isolation, RFLP.

A BANK ROBBERY – A PUZZLE SOLVED BY FORENSIC CHEMISTRY EXAMINATION

Maria Georgeta STOIAN, Elena GALAN, Georgeta ANDREESCU, Gheorghe NECHIFOR

Forensic chemistry performs qualitative and quantitative analysis of chemicals found on people, various objects, or in solutions. The final result of the forensic scientist's work, the expert report, has a direct influence on the fate of given individuals. This burden implies a high responsibility that determines the way of thinking and acting in forensic chemistry, as well as in other disciplines of forensic sciences. The goal of this presentation is to provide an example of a challenging case, in which neither fingerprint nor DNA analysis could provide scientific proof in a bank robbery, while forensic chemistry examination contributed to the identification of the offender.Both traces from the crime scene and the tools collected from suspect's residence were submitted for examination to forensic chemistry laboratories. Detailed chemical analysis of trace evidences, examination of all physical-chemical characteristics using the skills, the creative approach and the perseverance of the forensic chemists, on one hand, and the new equipments and analytical methods (FT-IR spectrometry, Scanning Electron Microscopy), on the other hand, provided a complete „history" of the samples, therefore playing a key role in characterizing samples, and could bring significant contribution to solving this bank robbery case.

Keywords: violent crime, trace evidences, FT-IR spectrometry, Scanning Electron Microscopy, comparison-identification

ETHYLENEDIAMINE FUNCTIONALIZATION EFFECT ON THE THERMO-MECHANICAL PROPERTIES OF EPOXY NANOCOMPOSITES REINFORCED WITH MULTIWALL CARBON NANOTUBES

Celina-Maria DAMIAN, Andreea Mădălina PANDELE, Horia IOVU

Functionalization of multiwalled carbon nanotubes (MWNTs) may improve the thermal and mechanical properties of the epoxy composites in which they are embedded as reinforcing agents. Amine groups were chosen to functionalize the carboxylated MWNTs due to their potential to form bonds with the epoxy resin used as polymeric matrix for composite materials. The attachment of the ethylenediamine (EDA) groups was proved by TGA, FT-IR and Raman Spectroscopy. The temperature at which the curing enthalpy is maximum, observed by DSC, was

shifted to higher values by adding only 0.3% functionalized MWNTs. SEM images show the dispersion of the MWNT-EDA within the composites.

Keywords: functionalization, nanotubes, thermal properties, epoxy nanocomposites

FORECASTING THE SORPTION OF PHOSPHATES IN SOIL WITH ARTIFICIAL NEURAL NETWORKS

Ecaterina DIACONU, Oanamari Daniela ORBULEȚ, Alexandra Raluca MIRON, Cristina MODROGAN

In this study, we are concerned with the prediction of adsorbed amount of phosphate and the sorption rate on soil particles in a chernozem from agricultural zone. Artificial Neural Networks (ANNs) have been used for modeling the behavior of phosphate (P) pollutant. The findings of numerous research studies also exhibit that the performance of ANNs is generally superior in comparison to traditional statistical methods, such as multiple regression, classification and regression trees and autoregressive models.

Keywords: sorption of phosphates, artificial neural networks, forecasting

INFLUENCE OF MECHANICAL ACTIVATION ON THE KINETICS OF NON FERROUS METAL SULPHIDES OXIDATION

Silviana ONISEI, Petru MOLDOVAN, Luminița MARA, Vasile PREDICA, Cornelia LUPU

The paper presents experimental research results on a new concept of oxidation in aqueous medium (solution of sodium carbonate) of copper sulphide concentrate in autoclave under air pressure in the temperature range 100 to 135 ^{o}C for 5 h, partial air pressure 5 atm in the presence of 30% excess of sodium carbonate more then stoichiometrical necessary for oxidation. Determinations were made in parallel on not-milled concentrate and mechanically activated concentrate. Based on the results obtained, the influence of mechanical activation on the kinetics of oxidation of sulphide concentrates was studied. By prolonged milling of copper concentrate, the activation energy decreases from 118.65 kJ mol^{-1} to 25.75 kJ mol^{-1}.

Keywords: Mechanical activation, milling, pressure oxidation, alkaline media, metal sulphides

MECHANICAL BEHAVIOUR COMPARISON BETWEEN UN-PROCESSED AND ECAP (Equal Channel Angular Pressing) PROCESSED 6063-T835 ALUMINUM ALLOY

Vasile Dănuț COJOCARU, Doina RĂDUCANU, Nicolae ŞERBAN, Ion CINCA, Rami ŞABAN

Equal Channel Angular Pressing (ECAP) is a very interesting method for modifying microstructure in producing ultra fine grained materials (UFG) and nanomaterials (NM). It consists of pressing test samples through a die containing two channels, equal in cross section and intersecting at an angle ϕ and a corner angle ψ. As a result of pressing, the sample theoretically deforms by simple shear and retains the same cross sectional area to repeat the pressing for several cycles. The 6063-T835 aluminum alloy was examined after six pressing operations by route BC in a $\phi = 90°$ and $\psi = 20°$ die. The specimens were processed for a number of six passes. Mechanical behaviour of the ECAP processed material was investigated by uniaxial tensile tests. It was found that, the ECAP process increases the mechanical properties. The significant increase in ultimate tensile strength (σ_{UTS}), yield strength (σ_{YS}) and strength to fracture (σ_F) after ECAP was observed and discussed by two strengthening mechanisms.

Keywords: Mechanical processing, Mechanical behaviour, Aluminium alloys, Nanocrystalline materials, Fracture surfaces

MORPHOLOGY OF THE METALLIC TIN ALLOTROPIC TRANSFORMATION AND IMPURITIES ROLE IN STRUCTURAL STABILITY ASSURANCE

Maria FAUR, Wilhelm KAPPEL, Brânduşa GHIBAN, Elena ENESCU, Magdalena LUNGU

The present paper presents the results concerning the morphology by electron microscopy and the way in which temperature and impurities contents may influence the nucleation and growth of the α Sn. Tin is a metal with polymorphic phenomenon, with great difference between two allotropic structure β and α.. The polymorphic transformation of tin is developed between nucleation and grains growth processes assured by atoms diffusion. The transformation is accompanied by metal volume increase and very high internal stresses, which may destroy the grains cohesion. Finally, the metallic material turns in a gray powder.

Keywords: tin, polymorphic transformation, crystalline structure

SIMULATION DE RÉSISTENCE À LA TRACTION ET COMPRESSION DANS UN COMPOSITE MACROMOLÉCULAIRE

Maria Cristiana ENESCU

Nanoparticles such as silica have been widely used for reinforcing polymer systems. Incorporation of nanoparticles in the manufacture of nanocomposite polymer matrix provides a method for obtaining hybrid materials that integrate the characteristics of each component in the final material obtained. The mixture of organic and inorganic substances has lead to a new material with superior properties separate components. The study performs the analysis simulation of tensile strength, compression respectively of a reinforced macromolecular composite with silica inorganic particles. Simulation has been performed by the program Soldworks and CosmosWorks.

Nanoparticules telles que la silice ont été largement utilisées pour renforcer des polymères. La fabrication des systèmes nanocomposites et l'incorporation de nanoparticules dans une matrice polymère fournit une méthode pour obtenir des matériaux hybrides qui intègrent les caractéristiques de chaque composant dans le matériau final obtenu. Le mélange de substances organiques et inorganiques, conduit à un nouveau matériau avec des propriétés supérieures a les éléments distincts. L'étude présente une simulation de la résistance à la traction et aussi à la compression d'un composite macromoléculaire renforcée avec des particules inorganique de silice. La simulation est fait en utilisant le programme Soldworks et COSMOSWorks.

Mots-clés: polyimide, nanocomposites, traction, compression, composites macromoléculaires

MECHANIC VIBRATIONS GENERATION SYSTEM AND EFFECT ON THE CASTING ALLOYS SOLIDIFICATION PROCESS

Crenguța Manuela PÎRVULESCU, Constantin BRATU

The paper discusses the possibility to apply a treatment to the liquid metallic materials and their crystallization under the influence of mechanical vibrations. To demonstrate the existence of the effect of the mechanic vibrations we tried to make them evident by solving two problems: 1 - by designing and implementing a facility to achieve mechanical vibrations, defined by certain parameters: frequency, amplitude acceleration, measured by using some instruments (checking and control electronic device), 2 - by changing the crystalline structure of metallic materials by

chill casting of metal samples. Tests were made on aluminium-silicon alloy castings under the influence of vibrations and classic gravity casting, to obtain a blank.

Keywords: vibrations, Al-Si alloys, metal mould casting

SELECTIVE RECOVERY OF GOLD FROM HYDROCHLORIC SOLUTIONS WITH AMBERLITE XAD-7 ION-EXCHANGE RESIN

Antoneta Filcenco – Olteanu, Tănase Dobre, Rozalia Rădulescu, Eugenia Panțuru, Răzvan Panțuru

The paper presents the results obtained in the selective recovery of gold from hydrochloric solutions using Amberlite XAD-7 ion-exchange resin. Experimental tests were conducted on real solutions obtained following selective leaching of gold from different metallurgical wastes, through wet chlorination. It was noticed that the acidity of the working solution, the flow through the bed and the working temperature influence the adsorption process dynamics. The gold elution from the loaded resin was made with a mixture of organic solvent and hydrochloric acid. The gold recovery efficiency based on the Amberlite XAD-7 selective ion-exchange resin was over 99.8%.

Keywords: gold, recovery, chloride media, Amberlite XAD-7

THE INCLUSION STUDY AND THE DETERMINATION OF ALUMINUM AND INSOLUBLE CALCIUM IN AIRCRAFT STEEL SAMPLES

Mariana BAHRIM

The present paper presents the data obtained as a result of the determination of the soluble/insoluble part of Ca and Al and the study of Al and Ca inclusions in aircraft steel samples When analyzing the samples, I used the Spark-Dat method and I analyzed the inclusion with the help of the 21 NEOPHOT Metallographic Microscope. The values for the fractions Al insol Al_{insol} / Al_{tot} *(0,077; 0,411; 0,083; 0,097; 0,400) and* Ca_{insol} / Ca_{tot} *(0,20; 0,14; 0,66;0,48;0.97), prove the fact that in the steel elaboration, conditions have been created for an improper*

behavior at continuous pouring. The values of the account $\frac{CaO}{Al_2O_3}$ *(0,00108; 0,00500; 0,02040; 0,02222; 0,18055) emphasize the fact that the steel from the samples forms the solid alumina at the temperatures of melted steel.*

Keywords: spark diagram, inclusion, Spark-DAT, Ca insoluble, Al insoluble