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Poster 034

SURFACE MODIFICATION OF HDPE, PP AND PET FILMS THROUGH KMNO4/HCL SOLUTIONS

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Surface modification of high-density-polyethylene (HDPE), polypropylene (PP) and Poly(ethylene terephthalate) (PET) films was promoted by potassium permanganate solutions in HCl acidic medium using eight different conditions: changing time, temperature and oxidative solution concentration. This oxidation system introduces different amounts of carbonyl-carboxyl and hydroxyl groups onto the surface of polymers. Drop water contact angle, FTIR, TGA and SEM were used to assess the efficiency of the oxidation and the changes suffered by the polymer film surfaces. The hydrophylicity of films obtained by contact angle was analyzed using a 23 factorial design in Design-Expert® program obtaining the main effects, the variance and the interaction between the effects acting in the oxidation process.

Poster 035

EVALUATION OF THE LEATHER RETANNED WITH NARROWER POLYDISPERSE POLY(ACRYLIC ACID)S

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Poly(acrylic acids) are used as a retanning agent on the leather process. In this study, polymers with narrow polidispersity and different molecular weights were synthesized through ATRP polymerization of t-butyl acrylate. The polymerization was carried out in bulk using CuBr/PMDETA as catalytic system and EBP as initiator. Further the poly(t-butyl acrylate)s were hydrolyzed in dichloromethane with trifluoracetic acid. The obtained poly(acrylic acid)s were used to retann leather of the middle region. The performance of them were evaluated by physical tests, thermal analysis (TGA/DSC), acrylic distribution degree on leather and scanning eletron microscopy. The results indicated the best softness and strength property for the leather retanned with low molecular weight polymers (Mn = 6100 g/mol; Mw/Mn = 1,08). Poly(acrylic acid)s with higher molecular weigth (Mn = 66000 g/mol; Mw/Mn = 1,09) given more filling effect and showed good distribution on fibres leather. Partially hydrolyzed polymer resulted in worse retanning action (lower crosslinking) when compared with the polymer with the same molecular weight, but totally hydrolyzed.

Poster 036

CHARACTERIZATION OF POLYMER MODIFIED MORTAR ADHESION MECHANISMS AT PORCELAIN CERAMIC SURFACES

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Porcelain ceramic surfaces, modeled as glass tiles, have been chemically modified by organosilane derivative bearing specific functionality. Mercapto group was chosen as reactive groups of silanes for evaluating their interaction to the Polymer Modified Mortar (PMM). SEM/EDX, Contact angle measurements and Fourier Transformed Infrared Spectroscopy were used as characterization techniques for evaluating interaction at ceramic/PMM interface. In addition, mechanical properties were investigated by adherence pull-off test. Contact angle results have given reliable evidence that they were altered from hydrophilic to hydrophobic after silane modification and FTIR spectra presented major peaks associated with the organic moieties. The adherence results were increased by polymer addition and tile surface modification.

Poster 037

MODIFIED VEGETAL OIL WITH POTENTIAL APPLICATION IN RIGID POLYURETHANE FOAM

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Modified soybean oil and castor oil were synthesyzed and used to prepare rigid polyurethane foam withsimilar properties of a commercial foam, generally applied in thermal insulations. The soy oil was firstlyhydroxylated, according to "in situ" peracid method, followed by a transesterification reaction with a polyfunctionalalcohol, while the castor oil was only transesterified. The vegetal polyols had been characterized through the OH-number, Brookfield viscosity and SEC. The foams were prepared at constant NCO/OH ratio (1:1) by the Hand Mixmethod and poured into an open steel box. The apparent density and the compression strength had been determinedrespectively by the mass/volume relation and through the DMA (TA Q800). After modification of the vegetalpolyols, an OH-number between 493-518 mg KOH/g oil was reached. The polyols showed a low viscosity andmolecular weight making possible the substitution of the commercial foam for the vegetal one.

Poster 038

CHITOSAN GRAFTED WITH PHTHALIC ANHYDRIDE FOR USE AS A POLYMERIC MEMBRANE

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Chitosan (a chitin deacetylation product) is a biopolymer with good physicochemical and biochemical properties that has been used in many fields. In our study, we grafted this polymer with phthalic anhydride (through amino and hydroxyl groups) to obtain an electrolyte polymer for use in Proton Exchange Membrane Fuel Cells (PEMFC). Different reaction times were studied and the products characterized by infrared spectra, considering the specific absorption bands corresponding to the imide, ester and carboxyl groups. The TG curves show that chitosan grafted with phthalic anhydride improves the degradation temperature of the material, increasing it from 320 to 420 °C, for undiluted chitosan and the grafted material obtained after 5 h of reaction, respectively.

Poster 039

CHANGES IN HYDROPHILIC CHARACTER OF CHITOSAN THIN-FILM BY HMDS COLD PLASMA TREATMENT

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This study evaluated the effects of the deposition of a hydrophobic silicon structure onto polysaccharide surface. The goal was to improve the water vapor barrier of a hydrophilic film for potential application as packaging. Cold-plasma technique was used for creation of a thin hexamethyldisilazane (HMDS) deposit at chitosan film surface. The resultant film was colorless and transparent. The effect on wettability was characterized through contact angle measurements and by swelling degree. A significant reduction in hydrophilicity was observed.

Poster 040

VERO CELLS BEHAVIOUR ON POLY(LATICTIDE-CO-GLYCOLIDE) MEMBRANES MODIFIED BY OXYGEN PLASMA

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The cell adhesion on the materials surface is critical because this phenomenon occurs before other events like cell spreading, cell migration and differentiated cell function. It is commonly accepted that the adhesion of cells to solid substrate is influenced by several surface properties, such as wettability, surface charge, roughness and topography. The surfaces of culture substrates can be modified by plasma treatment to improve cell growth, protein binding or non-binding. In this work the PLGA membranes was modified by oxygen plasma to improve the hydrophilicity of polymer and verify their influence in Vero cells culture. The PLGA membranes were characterized by SEM and contact angle, which showed a decreased in contact angles and an increased in rugosity surface. The cell adhesion, cytotoxicity assay, SEM and cytochemistry analyses showed that plasma treatment improved cell-polymer interaction.

Poster 041

CHITOSAN MODIFIED WITH REACTIVE BLUE 2: KINETICS AND ADSORPTION EQUILIBRIUM OF CU(II), CD(II) AND NI(II) IONS

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This trial aimed at immobilizing Reactive Blue 2 (RB 2) dye in chitosan microspheres through nucleophilic substitution reaction. The adsorbent chemical modification was confirmed by Raman spectroscopy and thermogravimetric analysis. This adsorption study was carried out with Cu(II), Cd(II) and Ni(II) ions and indicated a pH dependence. The pseudo second-order kinetic model resulted in the best correlation with experimental data obtained from Cu(II), Cd(II) and Ni(II), thus suggesting that adsorption rate of metal ions by chitosan-RB2 depends on the number of ions on adsorbent surface, as well as on their number at equilibrium. The adsorption equilibrium studies showed that CHS-RB 2 was more effective as an adsorbent for Cu(II) and Cd(II) than to Ni(II). Langmuir and Freundlich isotherm models were employed on experimental data analyses for adsorption, by linear equations. Langmuir model resulted in the best fit for allmetals and maximum adsorption was 57.0 $mg.g^{-1}$ (0.90 $mmol.g^{-1}$) for Cu(II), 61.6 $mg.g^{-1}$ (0.55 $mmol.g^{-1}$) for Cd(II) and 11.2 $mg.g^{-1}$ (0.19 $mmol.g^{-1}$) for Ni(II).