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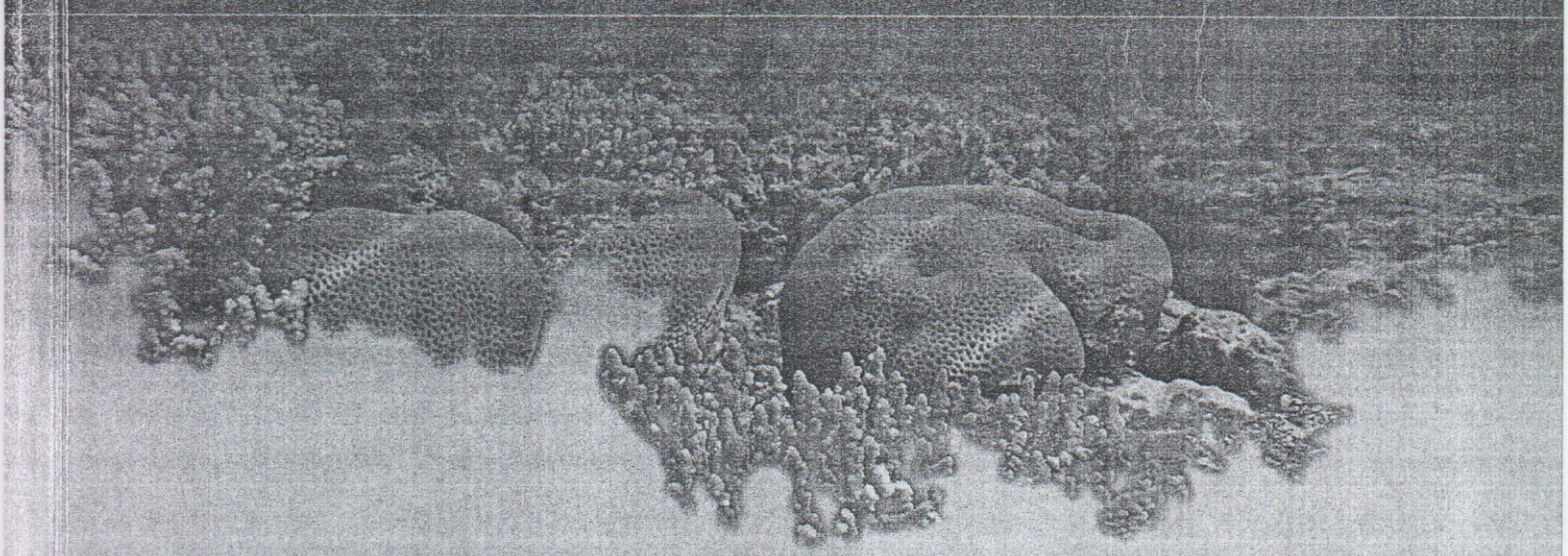
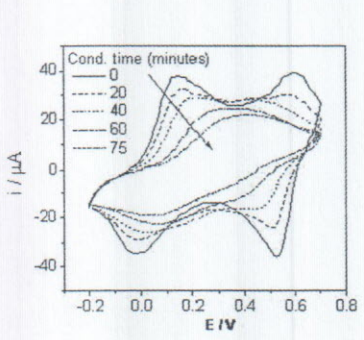
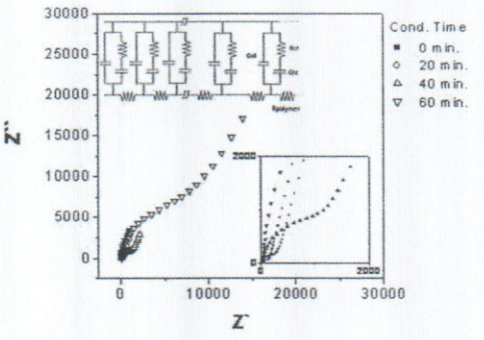


Book of Abstracts

ous solutions was adjusted to 3.0 by the dropwise addition of HCl 1.0 mol L^{-1}. The sulphonated polystyrene (4.0 mg) was diluted directly in 20.0 mL of the aqueous solution with pH 3.0, resulting in the negative charged solution. Before each immersion in the polyelectrolytes solutions (3 minutes) the films were immersed in a washing solution (15 seconds) and dried at air atmosphere (5 minutes). The procedure was repeated 10 times forming respectively 10 bi-layers of PANI and PSS. Figure 1 shows the voltammograms obtained after consecutive degradation steps for the PANI-PSS film. This figure shows clearly an important decrease in the electrochemical properties during the degradation process. Figure 2 shows the nyquist diagrams for those conditions presented in Figure 1. It was described in the literature [4-7] that the transmission-line models are adequate to describe porous materials. The used model is presented as insert in Figure 2. Analysing the results, it was observed that the polymer resistance and capacitance remains unchanged during the degradation process. Otherwise, it was observed an important increase of the charge-transfer resistance. This resistance could be associated to the dopant ions transport though the interface polymer chain – solution in the pore. Therefore, the presented data suggest that the main effect during the electrochemical degradation of these materials is an important change in the ions transport characteristics.





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AN ARTIFICIAL TASTE SENSOR BASED ON BLENDS OF POLYURETHANE/POMA [PTh50]

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The incorporation of conducting polymer into a conventional polymer matrix has received considerable attention in the last decade because of the possibility of combining the good processability and mechanical performance of the conventional polymer with the electrical and optical properties of conducting polymer [1,2]. Among conducting polymers, polyaniline (PANI) and its derivated has been extensively used because of the low cost of raw material, ease of synthesis and environmental stability [3,4]. Although the poly(o-methoxyaniline) (POMA) show less electric conductivity than PANI, it has the advantage of being soluble in higher variety of solvent. In this work, blends films of Polyurethane (PUR) based on castor oil and Poly(o-methoxyaniline) (POMA) were deposited on to gold interdigitated electrodes by spin coating and characterized by UV-vis-NIR and FTIR spectroscopy. The UV-vis-NIR spectrum of PUR/POMA showed the same isobestic point characteristic of doped-undoped POMA. The FTIR spectrum showed the chemical reaction of -N= of the POMA with the -NCO of the isocyanate of the PUR. Five different sensing units of PUR/POMA blends were able to, in the doped state, to distinguish between solutions from NaCl, HCl, citric acid and sucrose, in the frequency range from 1 to 1MHz. (a) (b) Figure - Capacitances measured at 100 Hz for solutions expressing different tastes at room temperature: (a) Sensors undoped e (b) Sensors doped with HCl.

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EVALUATION OF A BIOSENSOR FOR PHENOLIC COMPOUNDS BASED ON A NANOSTRUCTURED CONDUCTING POLYMER [PTu61]

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Biosensors represent an interesting alternative for the detection of phenolic compounds. Many different approaches can be found in the literature including carbon-paste biosensors [1], graphite composite electrodes [2], conducting polymer modified electrodes [3], and silica sol–gel composite films [4]. Some of these methods are relatively complicated, require the use of several reagents and often the biosensor produced presents stability problems. For that reason new alternative biosensor designs for phenolic compounds are needed. In this work was developed a biosensor using nanostructured films fabricated by the layer-by-layer (LBL) technique of polyaniline (PANI), sulfonated lignin (LS), polyallylamine hydrochloride (PAH) and tyrosinase (Tyr) on ITO. The LBL technique proposed by Decher [5] provides a possibility of a minimizing protein denature during the adsorption process, because this is carried out in aqueous solutions. The study of tyrosinase films formation was evaluated by UV-Vis spectroscopy. The cyclic voltammetry (electrochemical measurements) was used with a cell of three electrodes. All measurements was realized in a phosphate buffer solution (PBS) at pH 7 and 0,1 mol/L. The scan rate was 50 mV/s and

the potential range was -300 to 300 mV. Initially phenol was used as phenolic compound. During the studies of film's formations an increase in each bilayer formed with PAH and Tyr could be observed thus it is concluded that the enzyme's films were deposited and was possible to apply this in a biosensor. An increase in the reduction current with the increase of the phenol concentrations in the electrochemical measurements could be observed which is attributed to efficient catalytic reaction [6]. A calibration curve (with seven points) with r= 0,998 for the concentration range of phenol between 50 μmol/L to 3,5 x 10^{-4} mol/L was obtained. As observed, the biosensor studied exhibits a good potential for detection of phenolic compounds and the layer-by-layer technique seems to be suitable for immobilization of enzymes into the nanostructured thin films. Authors thank also CAPES, CNPq, DQ-UFSCar and Embrapa Instrumentação Agropecuária - Laboratório Nacional de Nanotecnologia para o Agronegócio for the given supports. e-mail: bello@ufscar.br

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DEVELOPMENT OF SENSORS CONSTRUCTED BY INTERDIGITATED PATTERNS OF GRAPHITE DEPOSITED ON VELLUM PAPER USING SUPERCRITICAL FLUID [RTuM6]

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The development of cheap and disposable sensor technology is considered a important issue since it can be built with low cost and used for many different applications, as for example agriculture, environmental monitoring and medical applications. The line-patterning method with graphite and conductive polymers is a technique that can be useful to be a "throw-away" electronic device, as for example electronic noses, biosensors and electronic tongues. Supercritical CO_2 (SC CO_2) has been extensively studied for chemical reactions, material synthesis and phase separations due to its no toxic characteristic, which minimizes the liquid residues problem. SC CO_2 has low viscosity, high diffusivity and zero surface tension. In this work, sensors were constructed by using interdigitated patterns of graphite [1], deposited on paper and coated with a thin film of polyaniline (PANI) in the emeraldine oxidation state doped with DBSA (dodecylbenzenesulfonic acid) using supercritical fluid. These results were compared with sensor coated with thin film of PANI doped with HCl produced by "in situ" polymerization. The resistance of the sensors was measured in static laboratory air and in flow of dry nitrogen at room temperature, alternatingly, and this procedure was repeated three times during 60 minutes (10 minutes each measurement). According to this procedure, the sensitivity and reprodutibility of each sensor were evaluated. These results showed a different behavior between the sensors obtained by SC CO_2 and "in-situ" polymerization. The resistance measured in the SC CO_2 sensor, when it was exposed into flow dry nitrogen, decreased with the time, and, on the other hand, the opposite effect was observed using the other sensor. It can be verified that both sensors presented good reproducibility (96%) and sensitivity (15.5%) when exposed to the different gaseous conditions. In this way, both sensors can be used to detect volatile organic composites, but the SC CO_2 sensor has demonstrated a longer lifetime than the other sensor. Acknowledgements CNPq, CAPES, FAPESP.

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THE ANION EFFECT IN THE DEVELOPING DISPOSABLE SENSOR USING LINE PATTERNING TECHNIQUE OF GRAPHITE [PTu63]

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The polyanilines is a class of polymer whose bigger difference in relation to other conducting polymers, which is you're doping mechanism [1]. The doping process of the polyaniline does not demand oxidereduction reactions, being enough only to the use of a protonic acid. With this a great variety of acid has been used. Moreover, the counterions, of the dopants, can infer to polymer the capacity to recognize chemical species of interest, as volatile organic compounds (VOCs) and water vapor (relative humidity (RH)), making with that its electric resistance change due to the interaction between the sample. This has been a used strategy in the development of chemical sensors based in polyaniline (PANI) for substances such as ammonia, hydro-carbons, and acetone and also humidity. In comparison with most of the commercially available sensors, based usually on metal oxides and operated at high temperatures, the disposable sensors made of conducting polymers, using line patterning technique [2] have many improved characteristics. They have good sensitivities and short response time; especially, these characteristic are ensured at room temperature. In this work was investigated the influence of different dopants, such as hydrochloric acid (HCl), methanesulfonic acid (MSA), p-toluenesulfonic acid (TSA) and camphorsulfonic acid (CSA) on the electrical properties of sensors made of thin films of polyaniline. These sensors were constructed by using line patterning technique (LPT), to developed interdigitated patterns of graphite deposited on vellum paper and coated with a thin film of conducting polymers. The sensors were coated with thin film of PANI doped with HCl by "in situ" polymerization method, in the emeraldine base. Then, this sensors were dedoped in NH_4Cl 0.1 M solution and then redoped with the desired dopant by anion replacement. The resistance of the sensors was measured in, alternating, static laboratory air (10 minutes) and in flow of dry nitrogen (10 minutes) at room temperature, repeating this procedure three times. According to this procedure, the sensibility (S %) and reversibility (n %) of each sensor were evaluated, whose results are listed in the Table I. Can be observed that was obtained an excellent reversibility