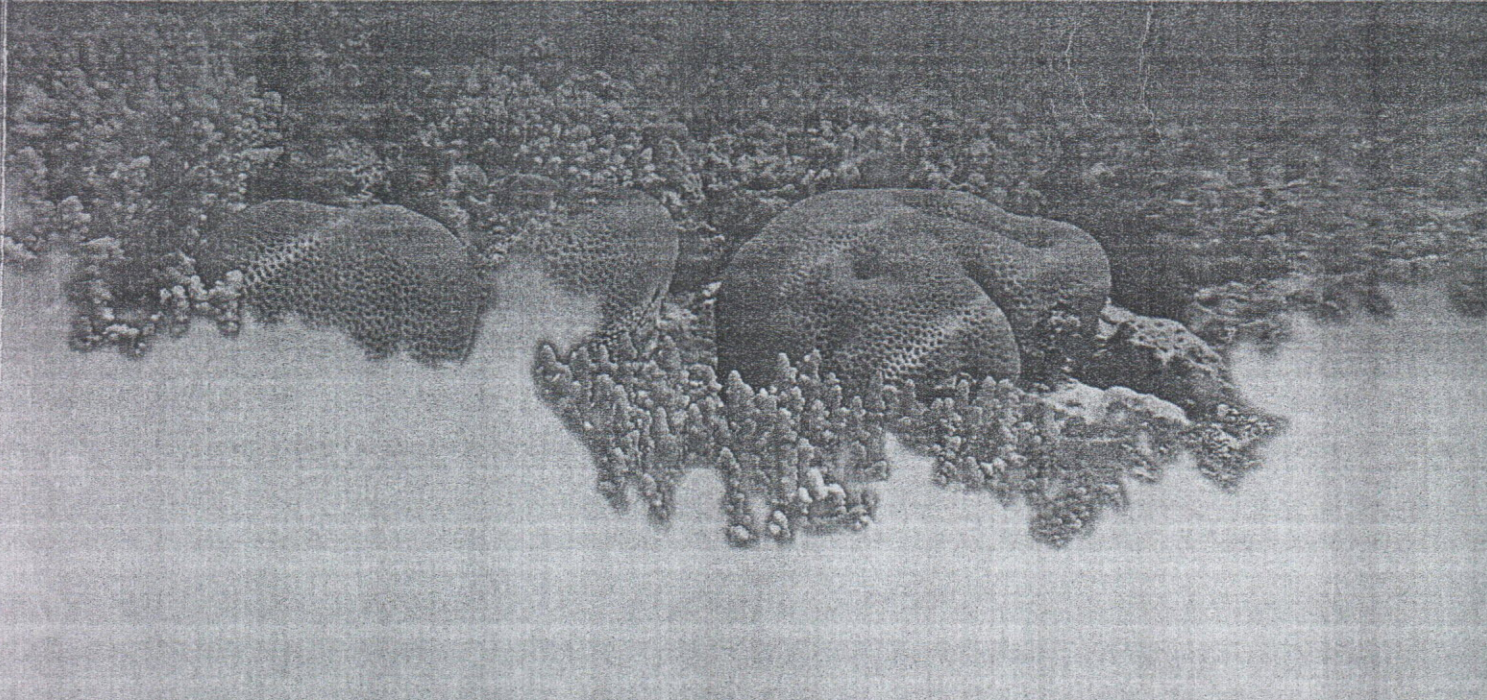


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NANOCOMPOSITES INCORPORATING CASHEW GUM/METALLIC PHTHALOCYANINES FOR DOPAMINE DETECTION [PM69]

The cashew gum (*Anacardium occidentale* L.) is a natural, biodegradable polymer found in the northeastern region of Brazil, which processing characteristics are similar to many synthetic polymers. Due to their polyelectrolyte character, cashew gum has been recently exploited as building block for layered, nanostructured thin films fabrication. In this study we investigate the electrochemical features of Layer-by-layer nanocomposites in which cashew gum was assembled in conjunction with either nickel tetrasulfonated phthalocyanines (NiTsPc) or iron tetrasulfonated phthalocyanine (FeTsPc). The multilayers were electrostatically adsorbed on indium tin oxide (ITO)-covered glass plates using a tetralayer architecture, in which poly(allylamine hydrochloride) (PAH) (cationic) layers were interposed between the gum and phthalocyanine (anionic) layers. Electrochemical characterization was carried out via cyclic voltammetry (CV) using an AUTOLAB PGSTAT30 potentiostat and a glass cell in the three-electrode configuration, in which the LbL film was used as the working electrode, a platinum plate was the auxiliary electrode and the saturated calomel electrode was used as reference. The CV experiments were performed in solution of H₂SO₄ 0.05 M at different scan rates. The PAH/gum/PAH/Pc LbL films displayed electroactivity, as shown in figure 1. It is important to note that cashew gum does not present electroactivity in the potential region observed. The cyclic voltammograms of PAH/gum/PAH/FeTsPc films in the presence of the dopamine (DA) are shown in Figure 2. A linear increase of the current as a function of concentration of DA was observed. A detection limit in the order of 2.2×10^{-5} M could be achieved, which suggest the applicability of the films as sensor elements.

SENSORS COMPOSED OF CONDUCTING POLYMERS FOR THE DETECTION OF CYANOTOXINS [PTh55]

Cyanotoxins can expose the people to health risks such as severe liver damage, acute poisoning, skin irritation, and gastrointestinal illness. Animals can die or survive accumulating sublethal levels of toxins transferring them to the chain food. Frequently the toxicity of cyanobacteria is strain specific and morphological observations alone can not predict the hazard level. Usually, the most used method for detection of these toxins is the HPLC plus mass spectroscopy. The absence of a field instrument for quick classification and detection of safe concentration of toxins is an apparent lack. Based on this, it is presented in this work the description of a system based on a multiarray of nanostructured conducting polymer sensors that by using impedance measurements are able to sense and classify the following species: *Anabaena spiroides*, *Cylindrospermopsis raciborskii*, *Microcystis aeruginosa*, and *Planktothrix tropicalis*. Also, the sensors are able to identify cyanotoxins by direct measurement in water bodies. Ultra-thin films made of organic compounds have received special attention in the last years due to the potential application in measurement systems. In 2004 was developed a sensory system that may be employed, amongst other uses, in the analysis of taste and for monitoring the quality of products intended for human consumption, and in the evaluation and detection of humic substances and other contaminants (organic or inorganic) in water from natural sources [1]. Sensory system is consisted of ten interdigitated electrodes or micro-electrodes sheathed with a layer of an ultra-thin film of a conducting polymer. The measurement system is based on the analysis of the response patterns obtained by the application of an AC signal to the sensors while they are immersed in the medium to be analyzed. Each electrode is recovered with a polyaniline layer. Polyaniline (PANI) and its derivatives are conducting polymers, which can be doped by protonic acid leading to great increase in the electrical conductivity and other related properties. These properties can be also further changed by the interaction with other compounds, which influence the structure, morphology or doping features of the polymer [2-4].

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STUDY OF THE ELECTROCHEMICAL DEGRADATION OF POLYANILINE/ SULPHONATED POLYSTYRENE SELF-ASSEMBLED FILMS [PTu53]

The self-assembly method has been used to prepare nanostructured materials for different applications as, for example, capacitive sensors [1]. This method allows to build alternated layers which could be sensitive to different analytes in the solution or in gas phase. In order to optimize the sensors properties and stability, an investigation of their electrochemical properties must be performed. In this work, we used a transmission-line model [2,3] applied to impedance data to study the degradation process which occurs in LBL films of polyaniline/sulphonated polystyrene self-assembled films, PANI-PSS. The bi-layers (PANI and PSS) were assembled by the subsequently immersion of the ITO substrate in aqueous solutions of polyelectrolytes solutions. The PANI powder (1.0 mg) was dispersed in 1.0 mL of dimethyl-formamide (DMF). This resulting dispersion was diluted (1:5) in a aqueous solution, resulting in the positive charged solution. The pH of the aque-

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1. Venancio et al. United States Patent Application, US 2004/0009585 A1, jan. 15, 2004.
2. A.G. MacDiarmid, A.J. Epstein, *Synthetic Metals*, v.65, p.103-116, 1994.
3. J.R. Santos Jr., J.A. Malmonge, A.J.G.C. Silva, A.J. Motheo, Y.P. Mascarenhas, L.H.C. Mattoso, *Synthetic Metals*, v.69, p.141-142, 1995.
4. L.G. Paterno, L.H.C. Mattoso and O.N. Oliveira Jr., *Química Nova*, v.24, n.2, pp.228-235, 2001.



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