VI Encontro SBPMat 2007

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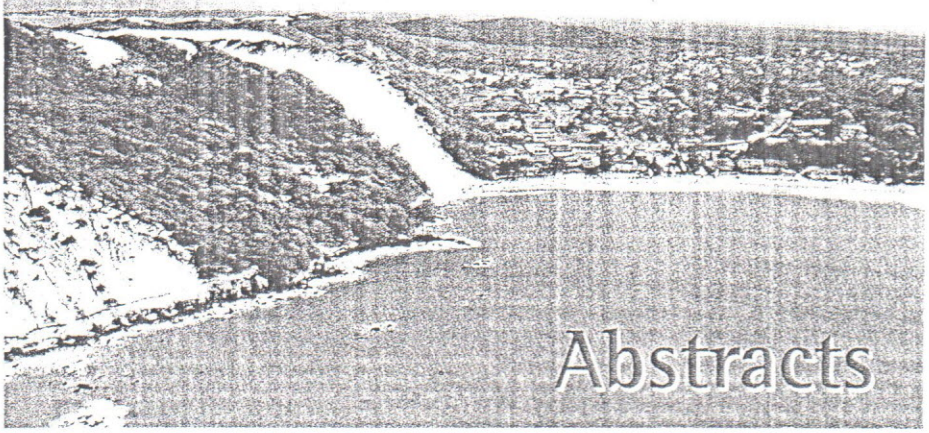

Abstracts

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Investigation of the Influence of the Water Vapor in the Electric Response of the Conductive Polymer used to Developed Disposable Sensor using Line Patterning Technique.

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Abstract – The influence of the water vapor in the electric response of the disposable electronic nose was evaluated. To investigation was conducted with conductive polymers (polyaniline in the emeraldine oxidation state doped with hydrochloric acid (HCl)) as an active layer of the device. The sensor was developed with line patterning technique (LPT), where the interdigitated electrodes of graphite and gold, to each sensor, was made atop overhead transparency (poly(ethylene terephthalate) (PET)).

In the last ten years the interest for developing new sensors for industry, agriculture, the environmental, medicine and military applications has increased [1-2].

Special interest has been devoted in sensing air-borne volatile organic compounds, VOCs, especially for compounds that have no chemical reaction with conducting polymers, such as aromatic and aliphatic compounds, alcohols, ethers, esters and halocarbons [1].

In this investigation was evaluate the effect of the water vapor in the electrical response [mV] of the sensors develop using line patternig technique (LPT) with conductive polymers (polyaniline (PANI) in the esmeraldine oxidation state, doped with hydrochloric acid (HCl) (PANI/HCl)) [3]. The substrate, to the sensors, was polyethylene terephthalate (PET) and two distinct 16 fingers electrodes were used: graphite and gold (Au). As common sensing layer to water vapor was used PANI/HCl. Porous medium, as ceramiques filter, from pure gypsum, was used in this investigation to obtain the influence of the water saturated, in the electrical response of each sensor. The total time of the experiment was 42 hours and 30 minutes, with data acquisition each 10 minutes (figure 1). A resistor was used to evaluate the base line (650mV). With modeling, showed in the figure 2, was observed that drying process is 2.58 times faster to electrode made with graphite than gold.

With this investigation were observed three main things: 1) the influence of water vapor in the electrical response of the sensors made with graphite and gold; 2) that gold and graphite could be used to developed interdigitated electrode to sensors using LPT and 3) a increase of the conductivity of the PANI/HCl as sensing layer, with the increase of the water vapor was observed. The investigations are carrying out using distinct doping of the conductive polymer, as the active layer.

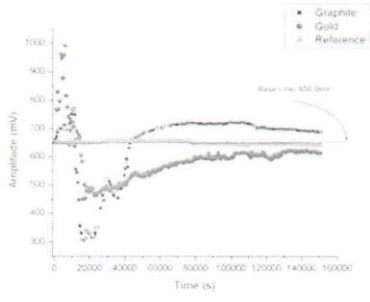

Figure 1: The electrical response (mV), during the time, of the influence of the water vapor in the conductivity of the sensors, developed with electrodes of -●- gold, -■- graphite. A resistor (Ω) was used, as reference.

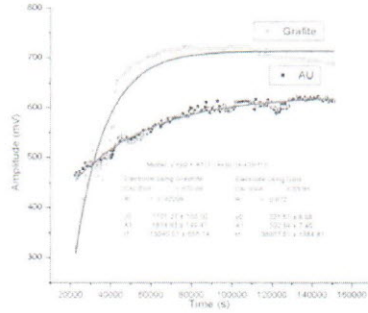

Figure 2: Modeling from the experimental data of electrical response (mV) using two electrodes (gold (black dots) and graphite (green dots)) during the process of the drying of the gypsum cup fully with water. The two sensors were coated with the same sensing layer (PANI/HCl).

References

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[3] Herrmann, P. S. P, Venancio, E. C., MacDiarmid, A. G., Mattoso, L. H.C., POLYANILINE-BASED SENSOR OBTAINED BY USING LINE PATTERNING TECHNIQUE ON PLASTIC, XVI CBECIMAT, Porto Alegre, RS, 28/11 to 02/12/2004, CD-ROM