

The substrate effect in the developing disposable sensor using line patterning technique of graphite

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Abstract –In this work the influence of the different substrates (vellum paper and PET (poly(ethylene terephthalate))) in the sensors performance was investigated. The electrodes were developed by the line-patterning technique and polyaniline thin films were obtained by "in situ" deposition in the emeraldine oxidation state. The performance of these sensors when submitted at different environmental conditions was evaluated using the electronic nose system and the results indicated that the substrates have influence on the sensor behavior.

The conducting polymers have attracted great attention due to its scientific importance and potential technological applications. The polyaniline (PANI) is the conducting polymer that has been most extensively studied, due to their mechanical, electrical and physico-chemical characteristics, making possible the development of innovative electronic devices [1]. The disposable sensors made of conducting polymers, using line patterning technique [2] have many improved characteristics in comparison with most of the commercially available sensors, based usually on metal oxides and operated at high temperatures. They have good sensitivities and short response time, these characteristics are especially ensured at room temperature.

In this work was investigated the influence of two substrates, vellum paper and PET on the electrical properties of sensors. These sensors were constructed using line patterning technique (LPT), to developed interdigitated patterns of graphite deposited on two substrates and coated with a thin film of polyaniline by "in situ" polymerization method. The performance these electrodes in, alternating, static laboratory air (10 minutes) and in flow of dry nitrogen (10 minutes) at room temperature, repeating this procedure three times was investigated by electrical properties measurements using electronic nose. According to this procedure, the sensibility (S %) and reversibility (η %) of each sensor were evaluated, whose results are listed in the Table I.

It can be observed that the sensibility of the sensor obtained with the vellum paper substrate was 46% more sensitive than the other sensor (PET substrate). However the sensor obtained with PET substrate showed higher reversibility. These results indicated that the substrate has influence on the performance of the sensors.

Table I: Reversibility and sensibility values of the sensors obtained in different substrates.

	Pani-PET	Pani-Vellum paper
S (%)	11,7 (\pm 0,53)	21,69 (\pm 0,25)
η (%)	95,1 (\pm 4,8)	88,4 (\pm 2,26)

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[2] E. C. Venancio, L. H. C. Mattoso, P. S. de P. Herrmann Jr and A. G. MacDiarmid, *Sensors and Actuators B: Chemical*, 130 (2008) 723.