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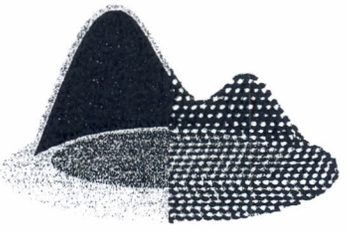

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We hereby certify that the work

"Polyaniline nanofibers obtained by pressurized fluid toward gas sensors construction" (I555)

by the authors Clarice Steffens, Alexandra Manzoli, Rafaella T Paschoalin, Elton Franceschi, Fernanda Castilhos Corazza, Jose Vladimir Oliveira and Paulo Sergio de Paula Herrmann

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Polyaniline nanofibers obtained by pressurized fluid toward gas sensors construction

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Abstract – Polyaniline has been one of the conducting polymers most widely studied due to its stability and reversibility. In this work gas sensors were developed using two techniques of coating: pressurized fluid of polyaniline doped with DBSA (dodecylbenzenesulfonic acid) and *in-situ* polymerization of polyaniline doped with HCl (hydrochloric acid). The sensitivity and reversibility of these sensors evaluated in electronic nose presented good results when exposed to the different gaseous conditions. It was verified by field emission gun scanning electron microscope (FEG-SEM) that the pressurized fluid coating method resulted in the formation of polyaniline nanofibers.

Despite the fact that a variety of polymers have been investigated, sensors currently produced cannot still replace laboratory-based analytical instrumentation and need fundamental improvements [1].The conducting polymers have shown great promise in a variety of applications such as light emitting diodes, chemical sensors, anti-corrosion coatings, batteries, and capacitors. The increasing demand for surfaces with specific and improved properties has motivated the development of new methods for polymer synthesis and processing that allow the control of surface properties at micro and nanometric scales in gas sensors [2].

In this work gas sensors were constructed using interdigitated patterns of graphite deposited on vellum paper. The conducting polymer film was deposited using two techniques: polyaniline doped with DBSA by precipitation assisted by pressurized fluid (carbon dioxide) and polyaniline doped with HCl by *in-situ* polymerization. The resistance of the sensors was measured in electronic nose, alternating static ambient air and flow of dry nitrogen gas (N_2) in a closed chamber. According to this procedure, the sensors sensitivity and reversibility were evaluated. The polyaniline films morphology was investigated by FEG-SEM.

Results showed a different behavior between the sensors obtained by CO_2 and *in-situ* polymerization. The resistance in the CO_2 precipitation sensor decreased when it was exposed to flow dry nitrogen, but the opposite effect was observed using the other sensor. It can be verified that both sensors presented good reproducibility and sensitivity when exposed to the different gaseous conditions. It was observed a granular morphology that is accompanied by nanofibers of polyaniline film (Figure 1) obtained with the pressurized fluid technology. This result opens up a new possibility for the construction of high-sensibility and simplicity devices.

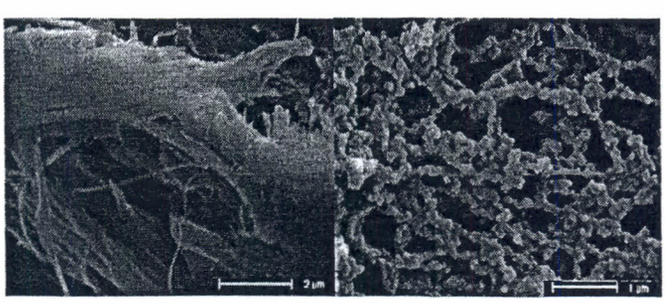

Figure 1: FEG-SEM image of polyaniline film obtained with the pressurized fluid method.

References

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