

## Electrodeposition of a Composite Material Film Based on Polypyrrol/Ag Particles on a Flexible Substrate: Application on the Detection of Volatile Organic Compounds.

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**Abstract.** The main objective of this work is to develop a chemiresistor gas sensor based on polypyrrole/Ag particles thin layers prepared by an electrochemical technic in a DBSA solution for the detection of volatile organic compounds (VOCs). These layers are electro-deposited by Cyclic voltammetry CV. The steps required to develop the sensor, from the synthesis, the characterization to the performance evaluation, were studied. The synthesized polymer films have been subjected to several structural and spectral characterizations, including FTIR, Raman spectroscopy and SEM, which have highlighted the role of the treatment of the substrates surfaces by the silane agent. In addition, the work required the realization of a chemiresistor measurement platform to carry out sensitivity tests on the target gases (NH<sub>3</sub>, NO<sub>2</sub>, methanol, ethanol, dichloromethane, CO<sub>2</sub>). After several injections in static and dynamic mode, all parameters relating to selectivity, sensitivity, detection limit, response time and reproducibility were determined at room temperature. The influence of environmental conditions was also studied. The tests carried out showed encouraging results confirming work previously realized, in terms of response time and detection limit.

**Keywords:** Electropolymerization, Polypyrrole films, Ag particles, chemiresistor, ITO substrates.