**PROTOCOL FOR THE MANUFACTURE OF MOX-TYPE SENSOR BASED ON ZINC OXIDE**

***Version 1.0***

**Produced by: Susana Marcela Silva Oviedo**

# O**BJECTIVE**

To show the Uniandes community the procedure that must be followed for the manufacture of MOx-type sensor based on zinc oxide for the detection of ammonia developed in the master's thesis "DESIGN AND MANUFACTURE OF AN EXPLOSIVE SENSOR AS AN INTRODUCTION TO A LANDMINE DETECTOR DEVICE".

# SCOPE

To make known to the Uniandes community the procedure that was followed for the manufacture of MOx-type sensor based on zinc oxide for the detection of ammonia developed in the master's thesis "DESIGN AND MANUFACTURE OF AN EXPLOSIVE SENSOR AS AN INTRODUCTION TO A LANDMINE DETECTOR DEVICE", in order to make reproduction possible.

## STEP BY STEP

## **MANUFACTURING PROCESS**

* 1. **(OPTIONAL)** Clean the SU-8 resin layer with which the interdigitated platinum electrodes from MicruX® were acquired previously using Stripper.

*ELECTRODE CHARACTERISTICS:*

* Rectangular shaped electrodes
* Pyrex substrate
* 15 pairs of fingers, with a width of 10µm, and a separation of 10µm
  1. Dehydrate a small amount (arbitrary amount) of Sodium Hydroxide NaOH, putting some pearls of this material on a small ceramic plate and introducing it into a muffle at 95°C for 1 hour.
  2. Mix the dehydrated Sodium Hydroxide NaOH with Zinc Oxide ZnO and Water H2O in a mass proportion:

*NaOH/ZnO/H2O - 1:1:0,25*



CAUTION: This is an exothermic reaction, so it will heat up.

* 1. Let stand for approximately 3 days to promote the crystallization of the mixture.
  2. Separate the supernatant by breaking the surface crystals and draining the liquid that is underneath this "hardened" layer.
  3. Incorporate the surface crystals into the precipitate of the mixture until it becomes homogeneous (breaking the crystals into the smallest pieces possible).
  4. Using a disposable micropipette tip or any other fine-tipped tool, deposit a small amount of the mixture on the interdigitated electrodes (the smallest amount possible that covers the active area of the electrodes should be deposited, minimizing the thickness of the layer).
  5. Activation of the interdigitated platinum electrodes by applying a cyclic voltammetry with sulfuric acid H2SO4 (1M).
  6. Heat the sensor by subjecting it for one hour at 100°C and then for three hours at 400°C on a hotplate.
  7. The sensor is ready! Now, the sensor must be connected to the data acquisition system and the necessary measurements taken..

# POSSIBLE FUTURE WORK

* Test the cold crystallization that was taking place at room temperature for 3 days (STEP 4).
* Use only the surface crystals for deposition on the interdigitated platinum electrodes instead of mixing them with the precipitate (STEP 6).

# CHANGE CONTROL

|  |  |  |  |
| --- | --- | --- | --- |
| **CHANGE DESCRIPTION** | **DATE** | **VERSION** | **APPROVED BY** |
|  |  |  |  |