Flow Rate/Pressure Effect on Base Resistance of MOX Gas Sensor

Rahul Prajesh, Vikas Saini, Jitendra Bhargawa, A. K Sharma and Ajay Agarwal

Base resistance of metal oxide films in an ideal environment (controlled humidity and temperature) depends on the oxygen molecules available. While characterizing metal oxide sensors at lab level, characterization setups include a test chamber. Pressure inside that chamber is dependent on the input flow, as the flow rate increases pressure will develop inside the chamber. Hence it is important to understand the flow rate effects on the sensor base resistance in controlled conditions. For this experiment dry air is passed through the testing chamber at different flow rates while keeping the output of the chamber at atmospheric pressure. Flow rates are varied from 100 to 1000 sccm in a step of 100 sccm and the sensing film resistance is monitored at the operating temperature of 250°C.

Sensor resistance increases with the increased air flow rate. Initially resistance changes drastically whereas the change decreases with the increasing flow rate. Material conductivity is dependent on partial pressure of oxygen and the conductivity of the substrate decreases as the partial pressure is increased. Each flow rate is maintained for 15 minutes and the resistance values after 15 minutes are plotted with the air flow rates. It is verified that the resistance *vs.* flow rate follows the power law. Detailed analysis of the experiment and the mentioned behavior will be presented in the paper.