



M I C R O S E N S

## Sensor Description

# Microsens Amperometric Sensor



**Integrated Electrochemical Sensor, Amperometric Sensor device on 4" silicon wafers**

■ The integrated amperometric sensor is a miniaturized electrochemical device manufactured by microelectronic technology. The planar device is realized with a three electrodes design and can be used to determine the concentration of a wide range of redox active chemical species.

■ The principle of Amperometry is based on the measurement of the current between the Working and Counter Electrode which is induced by a redox reaction at the Working

Electrode. The conditions are chosen in such a way that the current is directly proportional to the concentration of a redox active species in the analyte solution. The electrical potential of the Working Electrode versus the measured solution is achieved by a separate Reference Electrode and is controlled by a potentiostat electronic system.

■ The Working and the Counter Electrodes are platinum thin film layers manufactured on Si-wafer by a specific deposition process. Furthermore the

Reference Electrode is realized by a thin layer of Ag/AgCl which is manufactured by a similar process.

■ Organic membranes are photopolymerized on the Working Electrode area to separate the electrode surface from the measured solution leading to reproducible limited diffusion conditions.

■ The selectivity for a redox active chemical species is obtained by a suitable polarisation potential and a well defined photopolymerized membrane.

## Main advantages

- Small size
- High signal/noise ratio
- Low consumption of analyte
- Long term stability
- Well defined geometry
- Low cost

■ The on wafer manufacturing of the three electrode device and the membrane deposition with IC-compatible techniques bring the advantages of batch processing. This procedure reduces the cost and guarantees a high reproducibility of their characteristics.

■ The signal/noise ratio is very high due to the well defined active surface

geometry of the electrodes and the use of the well controlled diffusion limiting organic membrane photopolymerized on the electrode.

■ The small size of the electrodes leads to a low consumption of the analyte and makes the sensor suitable for the realization of a multi-sensor arrangement with an appropriate potentiostat electronic system.



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## General specifications

### **HOCl-Sensor**

Range:  $10^{-3}$  mg/l (1 ppb) - 10 mg/l  
Sensitivity: 10 nA / 1 mg/l  
Response Time: < 30 s (90 % signal level)  
Good linearity and fast response time

### **O<sub>2</sub>-Sensor**

Range: 0.1 % - 100 % partial pressure  
Sensitivity: 10 nA/torr  
Response Time: < 30 s (90 % signal level)  
Good linearity and fast response time

### **Further sensors for redox active species**

H<sub>2</sub>O<sub>2</sub>, O<sub>3</sub>, Redox reaction products, Ionic conductivity, etc.

## Applications

### **Industry**

- Process control and monitoring
- Water quality control

### **Water supplier**

- Control and monitoring of drinking water

### **Domestic use**

- Control and monitoring of water quality of swimming pools
- etc.

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