

# FIGARO GAS SENSORS

### Features

- Long life and good reliability
- High sensitivity
- Quick response
- High resistance to poisoning
- Excellent durability and shock resistance
- Large output signal
- Low cost



## FIGARO Gas Sensors

Figaro Engineering Inc. is the world's leading gas sensor manufacturer. Our technical and business expertise accumulated over the years has produced the most innovative sensors for the world market.

The Figaro Gas Sensor is a solid-state sensor mainly composed of sintered metal oxide which detects gases through an increase in electrical conductivity when reducing gases are adsorbed on the sensor's surface. The excellent stability and performance of the sensor provides maintenance-free, long-lived, and low cost gas detection.

Since 1968, over 120 million Figaro Gas Sensors have been used around the world. The application field of the Figaro Gas Sensor has since expanded from safety into health, control systems and instrumentation.

Various new applications such as breath alcohol checkers, automatic cooking controls in microwave ovens, air quality/ventilation control systems for homes and automobiles, etc. have been developed based on Figaro Gas Sensors. Based on its extensive and broad-based experience in developing and manufacturing gas sensors, Figaro continues to expand its expertise into new areas of gas detection.

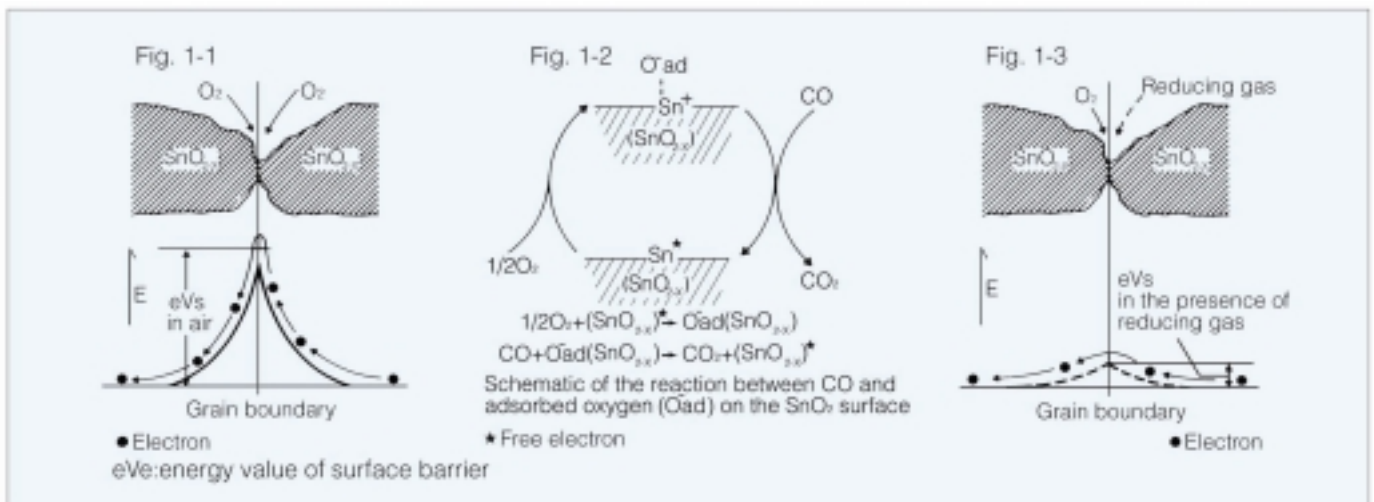
## Gas Detection Mechanism

Using SnO<sub>2</sub> as an example, when the sensor is heated to a high temperature (eg. 400°C) without the presence of oxygen, free electrons flow easily through the grain boundaries of the tin dioxide (SnO<sub>2-x</sub>) particles.

In clean air, oxygen, which traps free electrons by its electron affinity, is adsorbed onto the tin dioxide particle surface, forming a potential barrier in the grain boundaries. This potential barrier (eVs in air) restricts the flow of electrons, causing the electric resistance to increase (Fig. 1-1).

When the sensor is exposed to an atmosphere containing reducing gases, eg. combustible gases, CO, etc, the tin dioxide surface adsorbs these gas molecules and causes oxidation (Fig. 1-2). This lowers the potential barrier, allowing electrons to flow more easily, thereby reducing the electrical resistance (Fig. 1-3). The reaction between gases and surface oxygen will vary depending on the sensor materials and the type of gas.

Figaro provides various sensors which have different sensitivity characteristics by selecting the most suitable combinations of sensor temperature and activity of sensor materials.



## Field of applications

| Category  | Consumer products  | Commercial and Industrial products  |
|---|--|---|
| Combustible gas detection<br>-Methane<br>-Propane<br>-Hydrogen<br>-Others | <ul style="list-style-type: none"> <li>● Gas alarms for homes, recreational vehicles, boats</li> </ul>   | <ul style="list-style-type: none"> <li>● Gas leak detection for restaurants and kitchens</li> <li>● Gas detection systems for commercial buildings, industrial plants, onshore and offshore gas and oil platforms, petrochemical factories</li> <li>● Portable gas detectors</li> </ul> |
| Toxic gas detection<br>-Carbon monoxide<br>-Ammonia<br>-Hydrogen sulfide  | <ul style="list-style-type: none"> <li>● CO detectors for homes, recreational vehicles, boats, combustion appliances</li> </ul>                  | <ul style="list-style-type: none"> <li>● CO monitoring systems for car parks</li> <li>● Ammonia leak detection in refrigerators</li> <li>● Ammonia detection for the agricultural field</li> <li>● Gas detection systems in industrial plants</li> <li>● Portable detectors</li> </ul>  |
| Alcohol detection   | <ul style="list-style-type: none"> <li>● Personal alcohol checkers</li> </ul>  | <ul style="list-style-type: none"> <li>● Breath alcohol checkers for professionals</li> </ul>   |
| Organic solvent detection   |  | <ul style="list-style-type: none"> <li>● Solvent detection for factories, semiconductor industry, dry cleaning industry</li> </ul>  |
| Halocarbon gas detection (CFCs, HCFCs etc.)                               |  | <ul style="list-style-type: none"> <li>● Halocarbon detection for refrigerators, air conditioners, cleaning processes for electrical components, etc.</li> </ul>  |
| Odor detection<br>-Volatile sulfide<br>-Amine                             | <ul style="list-style-type: none"> <li>● Breath odor checker</li> </ul>  | <ul style="list-style-type: none"> <li>● Odor measuring systems for food industry etc.</li> </ul>   |
| Cooking control<br>-alcohol<br>-water vapor                               | <ul style="list-style-type: none"> <li>● Microwave ovens</li> </ul>  |   |
| Air quality control<br>-Carbon dioxide<br>-VOCs                           | <ul style="list-style-type: none"> <li>● Air cleaners</li> <li>● Air monitors</li> <li>● Air conditioners</li> <li>● Ventilation fans</li> </ul> | <ul style="list-style-type: none"> <li>● Air quality control for buildings, offices and automobiles</li> </ul>  |
| Others<br>-Oxygen   | <ul style="list-style-type: none"> <li>● Oxygen monitors</li> </ul>  | <ul style="list-style-type: none"> <li>● Oxygen detectors</li> </ul>  |

Also refer to:

Product catalogue① Figaro gas sensors 1-Series, 8-Series

Product catalogue② Figaro gas sensors 2000-Series

Product catalogue③ Other sensors and related products

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