

GSS Technology Background

Aeroqual delivers very high quality products based on a fundamental understanding of the chemistry, reaction rates and electronic interactions between materials and gases.

Gas Sensitive Semiconductor (GSS) technology is exclusive to Aeroqual. It is a combination of smart measurement techniques and mixed metal oxide semiconductor sensors that exhibit an electrical resistance change in the presence of a target gas.

This resistance change is caused by a loss or a gain of surface electrons as a result of adsorbed oxygen reacting with the target gas. If the oxide is an n-type, there is either a donation (reducing gas) or subtraction (oxidising gas) of electrons from the conduction band. The result is that n-type oxides increase their resistance when oxidising gases such as NO₂ and O₃ are present while reducing gases such as CO and hydrocarbons lead to a reduction in resistance. The converse is true for p-type oxides where electron exchange due to gas interaction leads either to a rise (oxidising gas) or a reduction (reducing gas) in electron holes in the valence band. This then translates into corresponding changes in electrical resistance. Quantitative response from the sensor is possible as the magnitude of change in electrical resistance is a direct measure of the concentration of the target gas present.

Since it is the surface reaction that causes the change in electrical resistance in the sensing oxide, it is beneficial to maximise the surface area to intensify the response to gas. To take advantage of this effect, commercial gas sensors consist of highly porous oxide layers, which are either printed or deposited onto alumina chips. The electrodes are usually co-planar and located at the oxide/chip interface (see diagram below). A heater track is also applied to the chip to ensure the sensor runs "hot" which minimises interference from humidity and increases the speed of response. The microstructure of the oxide, its thickness and its running temperature are optimised to improve selectivity. Catalytic additives, protective coatings and activated-carbon filters are also applied to enhance selectivity.

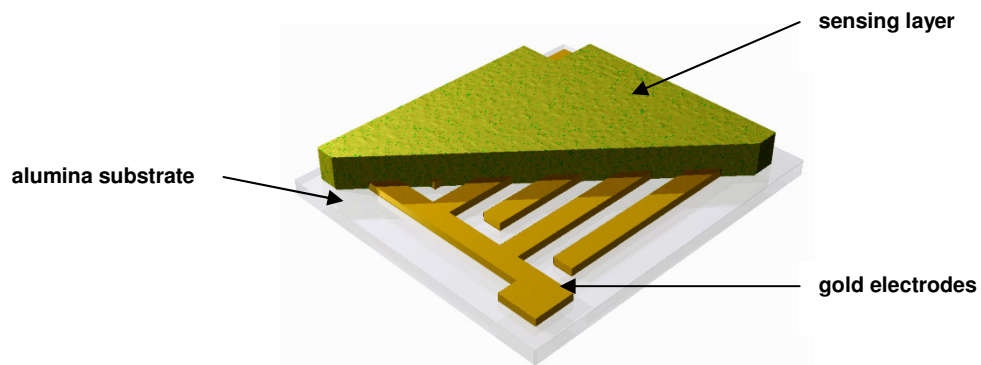


Diagram of typical sensor formulation

Aeroqual's GSS technology is the culmination of more than 25 years of materials research perfecting material formulations and optimizing sensor driver algorithms. Through the use of proprietary microprocessor driven code, reliable surface mount production, rigorous calibration procedures and exhaustive testing, Aeroqual has dramatically improved accuracy, T90 response, cross-sensitivities and sensor drift over competing technologies. Aeroqual maintains a strong research and development team and a commitment to market focused product development.

The Aeroqual range of GSS sensor-based products is unique in the global monitor market place and has been designed to provide near scientific accuracy, high reliability and functionality at an affordable price. Aeroqual's concept of fully interchangeable sensor heads eliminates the need for field calibration and provides users with unique application focused solutions. Moreover, Aeroqual products are complemented with a high level of service and support to distributors.