New applications and development trends for micro-machined MOS gas sensors

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Abstract
In the past decades, sensor technologies experienced tremendous progress and distribution. For gas sensing only, many different detection principles have been investigated and optimized over the years. Especially MOS gas sensors made it from basic research to application-driven developments and were ultimately incorporated into commercial products. Main drivers were improved reproducibility and stability together with the low cost potential. Especially the use of MEMS substrates offered new possibilities due to low power consumption, packaging options and operation modes.

Introduction
AppliedSensor is an international supplier of gas sensing solutions for air quality, comfort, control and safety applications. Specific products are used by customers representing the automotive industry, building technologies, consumer industry, white goods and appliance manufacturers. Depending on the specific application requirements, AppliedSensor can apply one of its three proprietary sensor technologies or even combinations. Together with qualified suppliers and partners, AppliedSensor has implemented production processes aiming at high quality, high reproducibility, high volume and low cost.

Application specific sensor solutions
Air classification modules are used to prevent harmful and unpleasant traffic related gases from entering the car cabin. One element was optimized for detection of reducing gases (mainly CO and hydrocarbons) and the other for detection of oxidizing gases (mainly NO_2). Through extensive testing and validation, an evaluation algorithm providing high correlation of predicted against measured CO/NO_2 concentrations was achieved.

Indoor air quality modules are used for demand controlled ventilation aiming at improved perceived air quality at reduced energy consumption. Most attempts to implement DCV in building applications so far rely on the quantification of CO_2 as a tracer of human occupancy. Real-life data, applying MOS gas sensor, GC/MS and GCO were recorded to detect VOCs and to identify odorous compounds in indoor air generated by humans and to bring out correlation of MOS gas sensor data with perceived air quality. Implying a suitable evaluation algorithm, a perfect correlation of predicted and measured CO_2 concentrations was achieved.

Results and Discussion
Above described applications are examples of MEMS MOS gas sensor technology implemented into finished products. Gas sensors provide a new dimension of product performance that serves to add value for the end-user. The diversity of applications and industries served, as indicated above, portend increasing importance in the roles that gas sensors play for consumer and industrial products. As sensor functionality and performance improve, there will be broader applications to be considered for gas sensors in everyday life.