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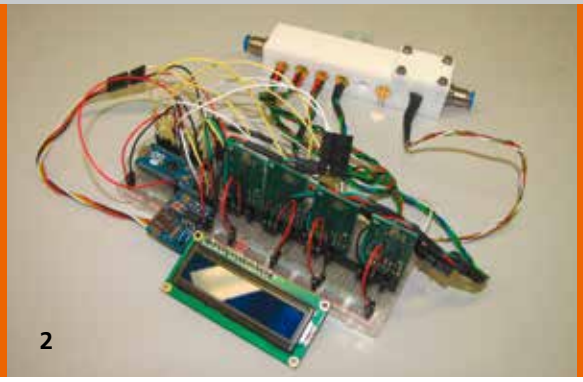

1 *Gas mixing plant with gas measuring stand.*
2 *Sensor logger for data aquisition.*

SENSITIVE AND SELECTIVE COATINGS FOR GAS SENSORS

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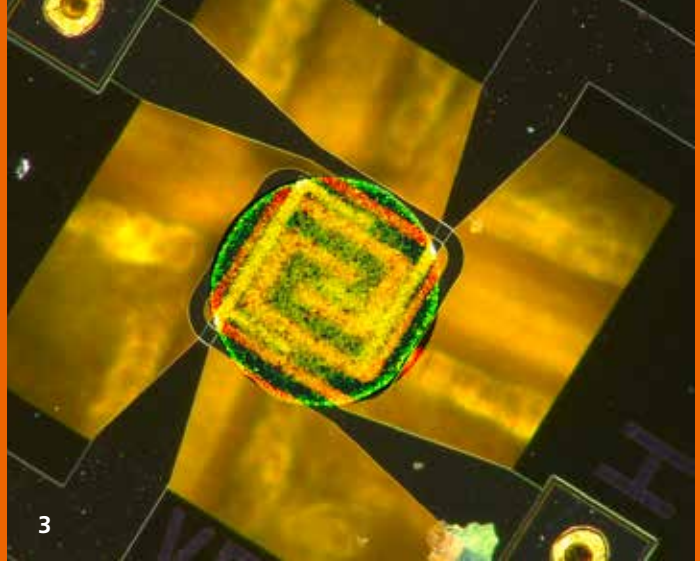
Challenge: Limited selectivity

Commercially available gas sensors are generally used for monitoring air quality and controlling air conditioning systems or for exhaust gas measurements in automotive, medical or environmental technology. They can detect single gaseous substances like CH_4, CO, NO_2 or a wide range of volatile organic compounds like alcohols, aldehydes, ketones, etc.

A disadvantage is that they have a greater or lesser cross sensitivity to other compounds, which prevents reliable identification of the target substance. Most sensors have only limited selectivity for certain substances. The human nose has about 350 scent receptors that can be compared to gas sensors. The difference, however, is that the scent receptors of the nose respond very specifically to few gases, while gas sensors respond to many gases.

Solution: Selective sensor layers

Fraunhofer IGB develops sensor layers that are sensitive and selective for specific compounds and integrates them into the customer-specific sensor concept. For this purpose, we use established sensors, at whose sensor-active layer we modify the surface in such a way that detection becomes more specific and selective by binding the target molecule. For example, we use specific polymers, organometallic framework compounds, surface enlargements by low-pressure plasma processes, the integration of oxidic nanoparticles or ionic liquids and adapt these to the selected measurement conditions.



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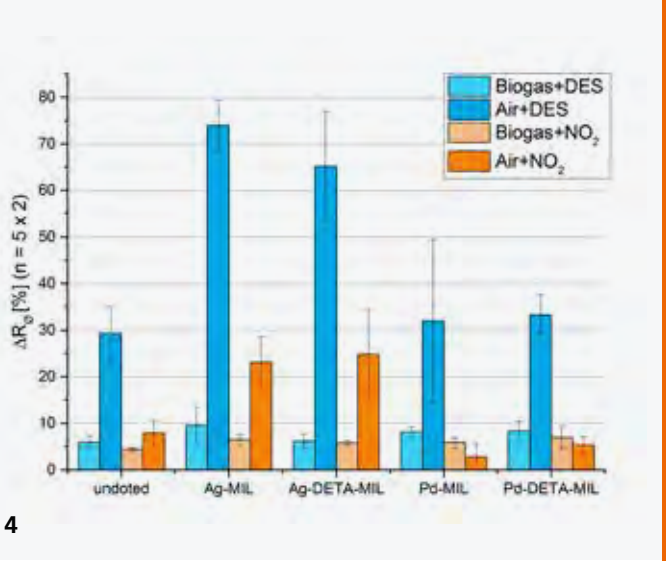

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Gas mixing plant for further optimization

We test and optimize the new sensors in our gas mixing plant with regard to their performance for the measurement of gases in a wide field. With the gas mixing plant it is possible to create a defined test atmosphere in a closed system. For this purpose, individual gases can be introduced in certain flow quantities, the air humidity can be regulated and the temperature in the pipes can be adjusted.

Advantages and Applications

By modifying the sensor-active layer, the detection of gases is much more specific and selective than before.

The development of novel intelligent gas sensor and monitor systems for the material characterization of industrial processes and an operating concept derived from them go hand in hand with the advancing digitalization in various branches of industry.

In the monitoring of manufacturing processes, selective and sensitive sensors can reduce costs by reducing defective products and defective batches.

By evaluating several sensors at the same time, where a certain analyte is most sensitively detected, more sensitive sensor arrays can be developed for certain analytes. This can be done in our gas measuring stand.

In addition, a data evaluation of the recorded measurement data can be connected in real time and the right measures can then be taken.

- Specific sensor surfaces for environmental gases and volatile chemical compounds
- Online monitoring of industrial processes for quality assurance
- Optimizable process control
- Adjustable inline and online analytics

Services

- Development of selective coatings for sensors
- Characterization of sensors at the gas measuring stand
- Feasibility studies and customer-specific conceptual development
- Evaluation of new processes
- Surface analysis and characterization
- Laboratory tests, benchmarking and validation

Equipment and equipment

- Gas mixing plant with gas measuring stand
- Surface analytics

3 *Coated sensor surface.*

4 *Comparison of relative resistance change in synthetic air and biogas atmosphere by use of different metal-organic frameworks (MOF) as doping material for metal-oxide-semicoductor (MOS) sensors (DES = diethyl sulfide).*