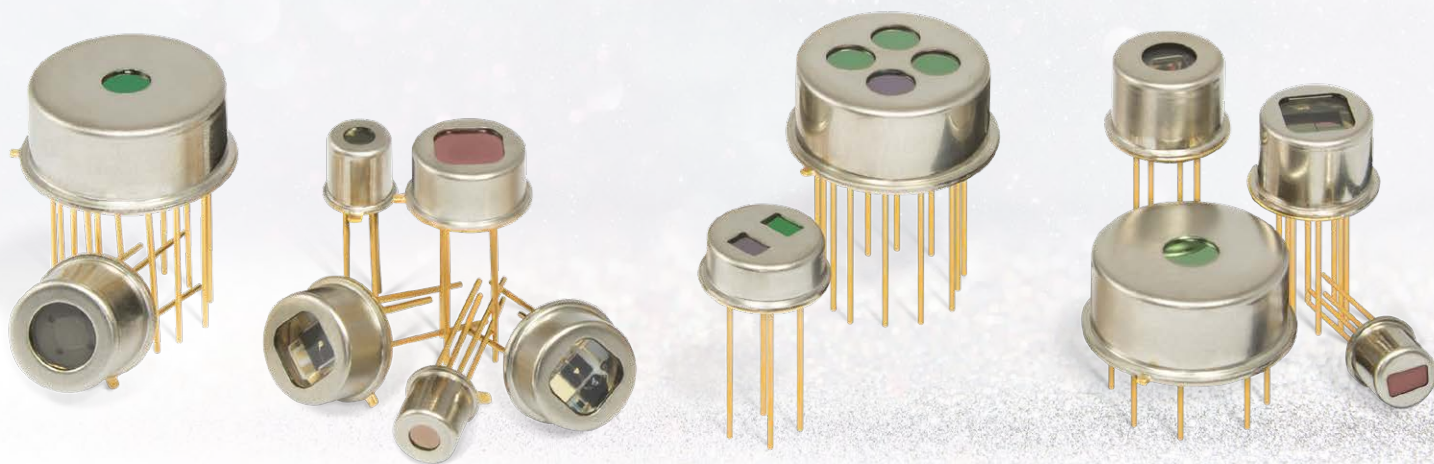


Sensor News



Dear readers of Sensor News,

Perhaps you have already heard the name InfraTec and possibly already know that we manufacture pyroelectric detectors. This newsletter will help you get better insight into our thinking and actions. What applications do we offer solutions for? What distinguishes our products from others on the market? Why are we the right partner for you?



Ideas from the Research & Development team provide important impulses for the continuous improvement of our detectors

Three of our corporate pillars provide the answer to the last question. The first lies in our progressive thinking. Each of the five employees of the infrared sensor division deal with R&D topics. Dresden, the city where our headquarters is located, is regarded as one of the most significant university locations for science in Germany. We utilise this asset actively and collaborate with universities, Fraunhofer institutes and other scientific partners.

The second column of our pursuit for innovative solutions is the high-quality production in a cleanroom measuring more than 1,000 m². Our employees responsible for this have many years of experience with the properties, application and processing of pyroelectric materials, in the electro-optic and -mechanical design of pyroelectric detectors, sensor-based signal processing and measuring technology. We know precisely what the preferred applications of our detectors are. This puts us in a position to offer you optimum solutions for your applications.

In addition, we attach great importance to the continuous expansion of know-how. With Dr. Matthias Heinze and Dr. Matthias Krauß both company founders continue to manage InfraTec. Just as faithfully, we have been pursuing the formula for success since



Major parts of the detector production in the cleanroom are now carried out by machines

the early days and have been developing high-quality, innovative pyroelectric detectors. Only the size of the range has increased in the last few years. But that is certainly to your benefit. To ensure that you can rely on our products in terms of quality, we also develop and produce our own instruments for measuring technology.



In selected work steps and the production of very small series, manual dexterity still plays a significant role

Furthermore, there is still much more to say about InfraTec. You will already learn a lot in this issue of Sensor News. Another issue will follow in the foreseeable future. So just keep us in mind.

Determination of the Proportions of Biogas with Detectors from InfraTec

Energy Miracle with Natural DNA

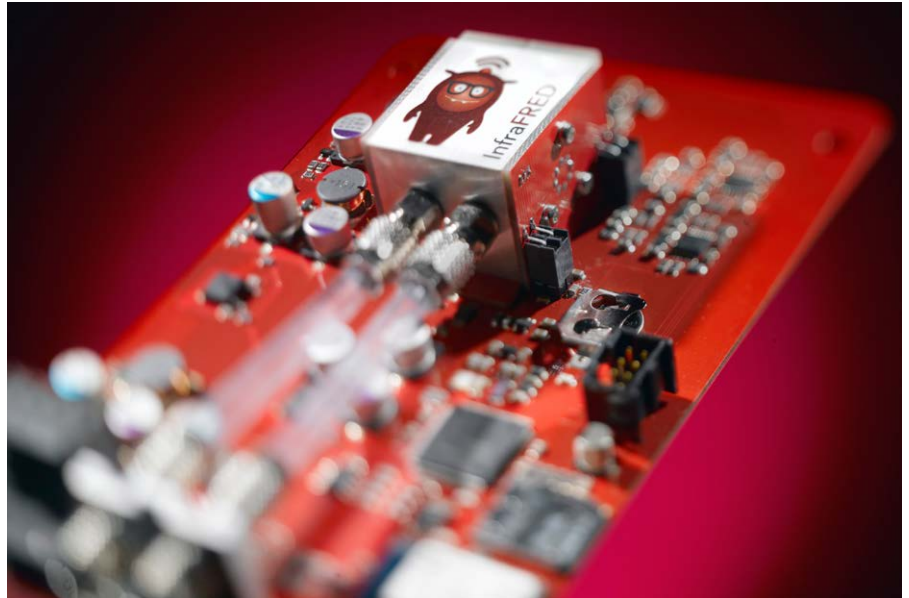
What does your breakfast egg from the weekend, a cornfield and a large portion of french fries from a fast-food restaurant have in common? They all provide raw materials for a biogas plant. Organic substances such as egg shells, corn or potato peelings are decomposed there naturally under airtight sealing. The result is an energy-rich and extremely versatile product – biogas.

Biogas can be converted into electricity, heat, gas or fuel. Its more important element is the combustible methane. The methane content varies between 50 and 65 percent depending on the raw material used, from which the biogas is produced. In addition, carbon dioxide occurs with a share of 35 to 50 percent. Furthermore, small concentrations of nitrogen, water, oxygen and hydrogen sulphide are found in the gas.

Specialist for the processing of biogas

Anyone who wants to use a sensor specially for applications involving biogas needs a solution that measures methane (CH₄) and carbon dioxide (CO₂). The Bavarian company Awite Bioenergie GmbH has developed a non-dispersive infrared sensor in double beam technology suitable for this purpose. To ensure that this meets its specific purpose, it has a very low cross-sensitivity of the CH₄ measured value particularly in relation to other hydrocarbons. The cross-influences of the gases being tested are adjusted within the sensor.

The determination of the exact proportions plays a crucial role, for example, when it involves the conversion of biogas to bio-



Awite's non-dispersive multi-gas sensor is suitable for biogas analysis due to lower drift rates and improved transverse sensitivity to other hydrocarbons

methane. The latter can be fed into Germany's natural gas grid. Provided that it has the same decisive properties as natural gas. Exact percentages are decisive here. Why? The respective energy suppliers have different requirements. For a feed-in, the minimum methane content is between 85 and

98 percent, depending on the requirements. Once fed into the existing gas network, biogas, for example, can be filled up at the fuel pump of a gas filling station. Since liquefied bio-methane (LNG = Liquefied Natural Gas) has an even higher energy density, even lorries and ships can be driven with it.

Detector News

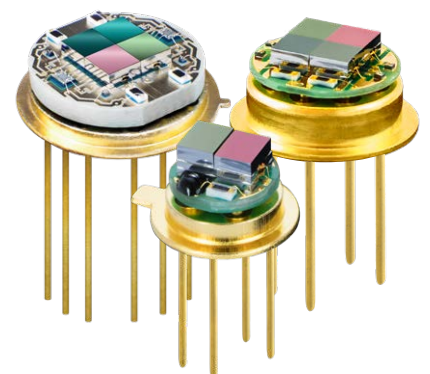
Cutting Edge Technology in Most Confined Spaces

Since its foundation InfraTec focuses on most advanced sensor technology meeting the needs of industry and science. Latest result of this effort is a series of miniaturised multi-channel detectors – the LRM series. All of their models combine a minimum size with a powerful performance. The most obvious of their features is a robust central window in the cap made of silicon for example, which can even be soldered for complete hermetic sealing.

Further feature highlights are:

- Channel filters inside the detector shielded from mechanical stress or from other stresses of harsh environments
- Detectors in voltage or current mode
- Complete assortment of dual- and quad channel detectors
- Significantly wider field of view (FOV)
- Modular stack design
- Available with and without thermal compensation
- Attractive pricing due to cost-optimised production

These miniaturised detectors suit for gas analysis and can be used in stationary and mobile devices ranging from medicine to safety technology.



Respiratory Gas Measurement System for Non-invasive Diagnosis with Pyroelectric Detector Health Care in One Breath

„Please strip to the waist.“ Medical examinations still frequently begin with this sentence. Still. This sentence could very soon be: „Please breathe out strongly.“ For research in the field of respiratory gas measurement systems are making considerable progress. The aim is clear: To make the diagnosis of illnesses easier and painless.

Several pricks in the fingertip or taking a blood sample several times from the vein – the diagnosis of diabetes is mostly accompanied nowadays with the repeated measurement of sugar levels in the blood. But you can smell diabetes. A slightly sweet fruity odour in the breath indicates the presence of this metabolic disease.

Biomarkers as indicators of diseases

Meanwhile this admittedly very vague examination method can be put on a sound footing. This is because a person's breath resembles a gaseous profile of their state of health. This contains several hundred volatile organic compounds. Many of these compounds (as so-called biomarkers) reliably



From Geratherm Respiratory GmbH's point of view, its prototype for respiratory gas analysis promises considerable advantages compared to previous solutions in terms of sensitivity and clinical applications

indicate diseases. The biomarker for diabetes is, for example, acetone, which is a fat reduction product.

Würzburg-Schweinfurt University for Applied Sciences as well as the Bavarian company Geratherm Respiratory GmbH are exploring such biomarkers. Both of these have developed the prototype of a respiratory gas measurement system for non-invasive diagnosis in a joint project assisted by Professor Walter Kullmann. This enables to detect lung diseases as well as metabolic and cancer diseases.

The use of infrared spectroscopy

The examination requires the patient to breathe strongly into the mouthpiece of the measurement system. The respiratory gases enter a spherical measurement chamber gilded with gold on the inside. Thermal infrared radiation strikes this chamber. Pyroelectric detectors with special filters measure the transmission of the gas mixture. The measurement results serve as a basis for the medical diagnosis. The biomarker acetone thus makes it possible to determine with a sensitivity of 3 to 13 parts per trillion per digit.



The examination by a doctor could look that simple and, above all, painless in the future - just breathe out strongly and a little while later the diagnosis will follow

This outstanding sensitivity creates the prerequisite for the early detection and monitoring of diabetes mellitus. And without a single prick.

Plans for 2019

New Manufacturing Capabilities

For some months now, InfraTec has been building on a large scale on its company premises. By the beginning of 2020, a completely new building will be constructed, which will increase capacities for the production of pyroelectric detectors in particular. The background of the construction project is the constantly increasing number of orders. This growth is attributable to increased demand from both long-standing regular customers and new customers from all over the world. The three-level building will provide space for new machines in the future and thus help to increase the proportion of automated production stages. This enables the company to produce larger quantities within a shorter time.

Visit us

You want the perfect opportunity to contact us directly to learn more about our products? Than meet us at numerous national and international trade fairs, conferences and meetings.

- **SPIE Photonics West**
San Francisco, California, USA
2 – 7 February 2019
- **Photonics World of Lasers and Optics**
Moscow, Russia
4 – 7 March 2019
- **SENSOR+TEST**
Nuremberg, Germany
25 – 27 June 2019
- **SENSOR CHINA**
Shanghai, China
2 – 4 September 2019

Workshop for Junior Engineers

Infrared sensors are an extremely interesting and at the same time very complex subject area. That is why we have set ourselves the goal of supporting engineers who are just entering the industry with our specialist knowledge. In a workshop in the second half of 2019 we would like to give them all they need to know about the use of pyroelectric detectors. The focus of this premiere is clearly on practice. In selected lectures we give a lot of tips on how detectors work and how to use them in everyday life. At this point, it is particularly important to us to encourage professional exchange between the participants. In addition, our application engineers will be available to answer questions on that day.

Detectors with Spectrometer Functionality for Use in Cannabis Analysis

Smells Like Medicine

Cannabis serves as a basis for oils, fragrances, clothing, intoxicants – and as a medicine. Already several thousand years ago the Chinese used it as a remedy against rheumatism. Nowadays, researchers worldwide are again dealing with the medical use of the plant. Infrared sensors provide answers to the question of which type contains which active ingredients.



The Big Sur Scientific BSS 2000 Cannabis Analyzer supports analysis of medically relevant substances of cannabis

Marijuana is becoming increasingly legal in North America. This means there is a need for businesses to quickly and easily analyse their cannabis medicine products to insure their safety and efficacy. Of greatest interest is quantifying the cannabinoids and terpenes in these products. Therefore, Big Sur Scientific, a California-based team of scientific and engineering professionals, have interfaced a tunable detector using a Fabry-Pérot filter

(FPI) by InfraTec with an Attenuated Total Reflectance (ATR) sampling cell. This innovation allows mid-infrared spectra of liquids and solids to be measured easily with no sample preparation, little sample sacrifice, and minimal clean up.

Analysis of medically relevant substances

Cannabinoids are molecules found in marijuana that interact with the human body's endocannabinoid receptors. The most famous cannabinoid, Tetrahydrocannabinol (THC), has psychotropic activity. Other cannabinoids present in marijuana have medicinal properties. For instance, Cannabidiol (CBD) was recently approved by the United States Food and Drug Administration as a treatment to reduce the number of seizures in certain kinds of epilepsy.

Terpenes are small, volatile molecules responsible for much of the smell and taste of cannabis and many other foods and be-

verages such as beer and citrus fruits. There are several that are typically found in all samples at significant concentrations. Among the more than 200 different terpenes, there are compounds with a floral, fruity, spicy, earthy or chemical note. The most common terpenes include limonene which smells like limes, and the pinenes which, as you may have guessed, smell like pine needles.

Need for precise measurement data

Measuring the concentrations of several cannabinoids and the amounts of a number of terpenes in such samples is of vital interest. Terpenes and cannabinoids can interact with each other and thus sometimes have completely new effects. Anyone studying such interactions and their significance for medical science needs reliable data on the characteristics of the different cannabis varieties.

InfraTec Worldwide

Where It All Began

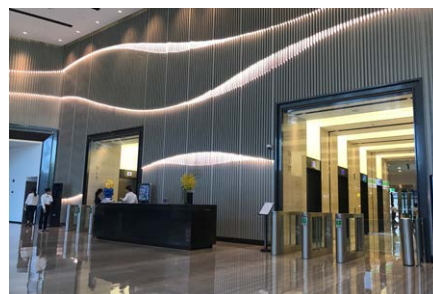
With the foundation of the company InfraTec has found its home at the headquarters in Dresden. This is where the heart of the company beats the most. Here the majority of our 200 or so employees work, most of our ideas are born and all the threads run together with regard to the coordination of our international activities.



Headquarters in Dresden, Germany

Right Next to You

For more than six years InfraTec has been operating directly from Shanghai. With the support of the German Chamber of Commerce, we are very close to one of the markets with the strongest growth worldwide. Our local Chinese employees are experts in the field of infrared sensor technology as well as in the regional high-tech industry.



Entrance of the Gopher Center in Shanghai

Strategically Valuable

America in general and the USA in particular are among the major trendsetters of infrared sensor technology. Therefore, InfraTec has been present with its own subsidiary for more than ten years. This allows us to attend important trade shows and conferences right away and to offer the best customer service within shortest terms.



Sales office InfraTec in the USA



Imprint: Headquarters InfraTec GmbH Infrarotsensorik und Messtechnik

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