

PRESS RELEASE

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Mobile analysis system for trace substances in liquids

Erlangen/Lund: Until now, time-consuming laboratory tests were necessary to detect pollutants and contaminants in liquids such as drinking water or juices. Now a novel mobile measuring device developed by Fraunhofer Institute for Integrated Circuits IIS in cooperation with CapSenze can quickly and reliably detect the presence of biochemical substances.

Pesticides in fruit and vegetables, hormones and antibiotics in meat, mycotoxins in foodstuffs and animal feed, or bacteria and germs in drinking water – polluted or otherwise contaminated food and drink pose a significant health risk. Until now, time-consuming and expensive laboratory tests were necessary in many cases to detect pollutants and contaminants in foodstuffs and liquids. Now a biosensor system developed by the Swedish company CapSenze which integrates an optimized evaluation circuit from Fraunhofer IIS is able to analyze liquids by means of biochemical sensors in a couple of minutes. The system is suited for mobile use due to its convenient size which is comparable to a box of matches.

The biosensor system can, for example, be used for on-site detection of contaminants in water and all water-soluble substances. It can also be employed for mobile foodstuff inspection, to monitor food chains and for detecting doping agents.

Six different substances can be measured simultaneously

Supplying measurement data in the pico- to femtomole (10^{-12} - 10^{-15} moles per liter) range, the six different sensors of the biosensor system allow simultaneous detection of six different substances. Different sensor coatings, depending on the substance to be detected, are used to determine the presence of unwanted substances in foodstuffs and animal feed. The biosensor system is a highly sensitive piece of equipment which can identify, with the corresponding sensor coating, the presence of biochemical substances such as hormones, pesticides and mycotoxins in extremely low concentrations.

The biosensor system employs molecularly imprinted polymers (MIPs). The gold-plated electrodes of the device are coated with these selective MIPs. In the same way that a footprint makes an impression in wet cement, the molecules of the specific target substance are imprinted in these polymers. When the molecules of the pollutant or contaminant come into contact with the corresponding molecularly imprinted polymer, they then form a bond and change the electrical properties of the electrode. Each sen-

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sor is designed to react solely to a specific target substance and can even detect it in extremely low concentrations.

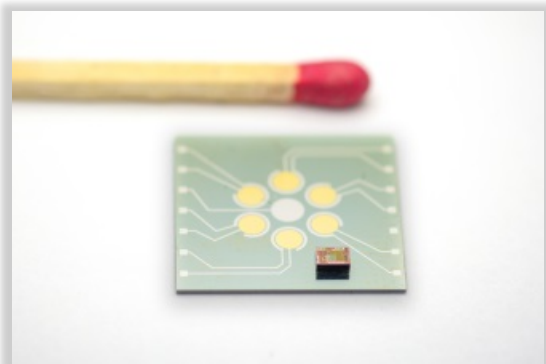
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Mobile applications for highly accurate measurements

The evaluation component of this biosensor system has been developed by Fraunhofer IIS in the form of an integrated, capacitive evaluation circuit which boasts a measuring resolution of below 0.1%. Further advantages of this application-specific integrated circuit (ASIC) are its low energy consumption in the microwatt range and, through its integration, the small dimensions of the entire biosensor system of just a few centimeters. This means that the device is suitable for mobile applications, enabling quick on-site testing that is just as reliable but considerably less expensive than lab tests. In parallel, CapSenze has developed a new miniaturized transducer chip with six measurement electrodes. Compared to conventional measurement devices, this equipment can analyze six different substances simultaneously. On account of the automatic control of all functions, the system works autonomously without the need for human intervention.

About CapSenze

CapSenze was founded 2009 as a spinoff company from Lund University. The company is built around two technological platforms, a patented high-performance capacitive biosensor technology (CapSenze BioSystem) and a versatile flow-injection analytical system (CapSenze FlowSystem). Both platforms hold more than 15 years of research from Lund University. In addition, the persons involved in CapSenze have broad competence within the field of biotechnology and life sciences. More information: www.capsenze.se.



Thanks to an integrated evaluation circuit from Fraunhofer IIS, the biosensor system manufactured by CapSenze can be reduced to the size of a match box.

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IN COOPERATION WITH



The Fraunhofer-Gesellschaft is the leading organization for applied research in Europe. Its research activities are conducted by 69 institutes and research units at locations throughout Germany. The Fraunhofer-Gesellschaft employs a staff of 24,500, who work with an annual research budget totaling more than 2.1 billion euros.

The **Fraunhofer Institute for Integrated Circuits IIS** is one of the world's leading application-oriented research institutions for microelectronic and IT system solutions and services. It is the largest of all Fraunhofer Institutes. Research at Fraunhofer IIS revolves around two guiding topics: In the area of **"Audio and Media Technologies"**, the institute has been shaping the digitalization of media for more than 30 years now. Fraunhofer IIS was instrumental in the development of mp3 and AAC and played a significant role in the digitalization of the cinema. Current developments are opening up whole new sound worlds and are being used in virtual reality, automotive sound systems, mobile telephony, streaming and broadcasting.

In the context of **"cognitive sensor technologies"**, the institute researches technologies for sensor technology, data transmission technology, data analysis methods and the exploitation of data as part of data-driven services and their accompanying business models. This adds a cognitive component to the function of the conventional "smart" sensor.

More than 900 employees conduct contract research for industry, the service sector and public authorities. Founded in 1985 in Erlangen, Fraunhofer IIS has now 13 locations in 10 cities: Erlangen (headquarters), Nuremberg, Fürth, Dresden, further in Bamberg, Waischenfeld, Coburg, Würzburg, Ilmenau and Deggendorf. The budget of 150 million euros is mainly financed by projects. 24 percent of the budget is subsidized by federal and state funds.

Detailed information on: www.iis.fraunhofer.de/en