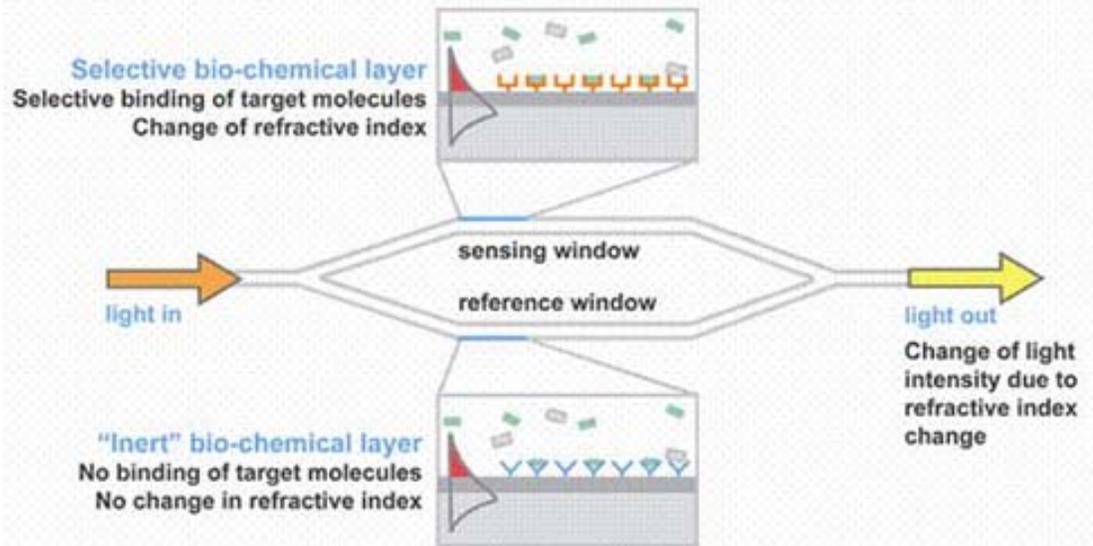


SENSOR TECHNOLOGY ALERT

INNOVATIVE WATER CONTAMINATION DETECTION TECHNIQUES

According to the World Health Organization (WHO), access to drinking water is essential to health, a basic human right, and a component of effective policy for health protection. Water is an extremely vital element for life, and consumption of contaminated water can result in severe health risks. Contaminants can range from toxic chemicals, infectious agents, or radiological hazards to name a few. There are rising concerns about the safety and accessibility of drinking water throughout the world. Statistics indicate that over 30% of the world does not have access to safe drinking water. An improvement in access to safe drinking water can result in tangible improvements in health.

Based in Singapore, Optiqua Technologies Pte. Ltd. realizes the importance of clean water and is committed to developing solutions to detect contamination in water. The company focuses entirely on the water industry and aims at developing a range of products based on an innovative optical biosensor technology. Optiqua is a subsidiary of the Dutch biotechnology company, Optisense. Optisense has developed the aforementioned core optical sensor technology upon which Optiqua's products are based. This generic optical sensor technology is based on the Mach Zender Interferometer (MZI) that measures changes in the refractive index as a result of the presence of contaminants. It can also be tailored to detect specific biochemical substances in water by incorporating bio-chemical layers to the generic platform.



Technology Principle

Picture Credit: Optiqua Technologies Pte Ltd

There are two basic techniques of applying the core technology. One is to use the chip without any biochemical interface, which makes it a generic sensing chip. The other utilizes a specific biochemical interface thereby making it a target sensor. The EventLab, an early warning system, is based on the generic sensing principle. It measures the bulk refractive index of the water as it is being distributed through the distribution network of the drinking water company. By monitoring changes in the refractive index of the water in conjunction with dedicated software algorithms, natural fluctuations in water are filtered out and relevant, potentially health threatening alerts/events are identified. A special feature of the product is that it can easily be deployed online within the distribution network owing to its small and modular design. Tests indicate that Optiqua's generic sensor provides results that outperform alternative solutions by a factor of 10.



Optiqua EventLab

Picture Credit: Optiqua Technologies Pte Ltd

Based on the same core technology, the application of a biochemical interface to the sensor chip surface forms an antibody layer that binds with the specific target contaminant that is to be detected. When the water flows over the sensor's surface, a binding process starts. This results in a change in the thickness of the layer, which in turn causes a change in the refractive index. This is then compared with a reference window where there is no biochemical interface. By measuring the change in the refractive index in combination with the MZI principle, concentration of the contaminant can be detected at very high sensitivity levels. The system, called MobileLab, offers real time responses (within a few minutes) at high sensitivity with a focus on organic contaminants. MobileLab, scheduled for early 2010, is based on a modular, low maintenance, and easy to use mobile design.

In the future, online detection of the target sensor will be developed for microbial detection and will be called Optiqua LabOnline. Microbial contamination can cause direct health risks such as E-coli and can easily develop within a distribution network and can be challenging to detect. According to Melchior van Wijlen, CEO Optiqua Technologies, these challenges will be addressed by the company's LabOnline product that is slated for release in 2010.

There is a strong quest for efficient sensor systems that are highly sensitive, provide data in real time and are easy to deploy at a relatively low total cost of

ownership. Optiqua's systems are designed to meet these requirements. The company works closely with research institutes, public organizations and major international industry partners, such as Vitens, purportedly the largest drinking water company in the Netherlands, and PUB in Singapore.

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