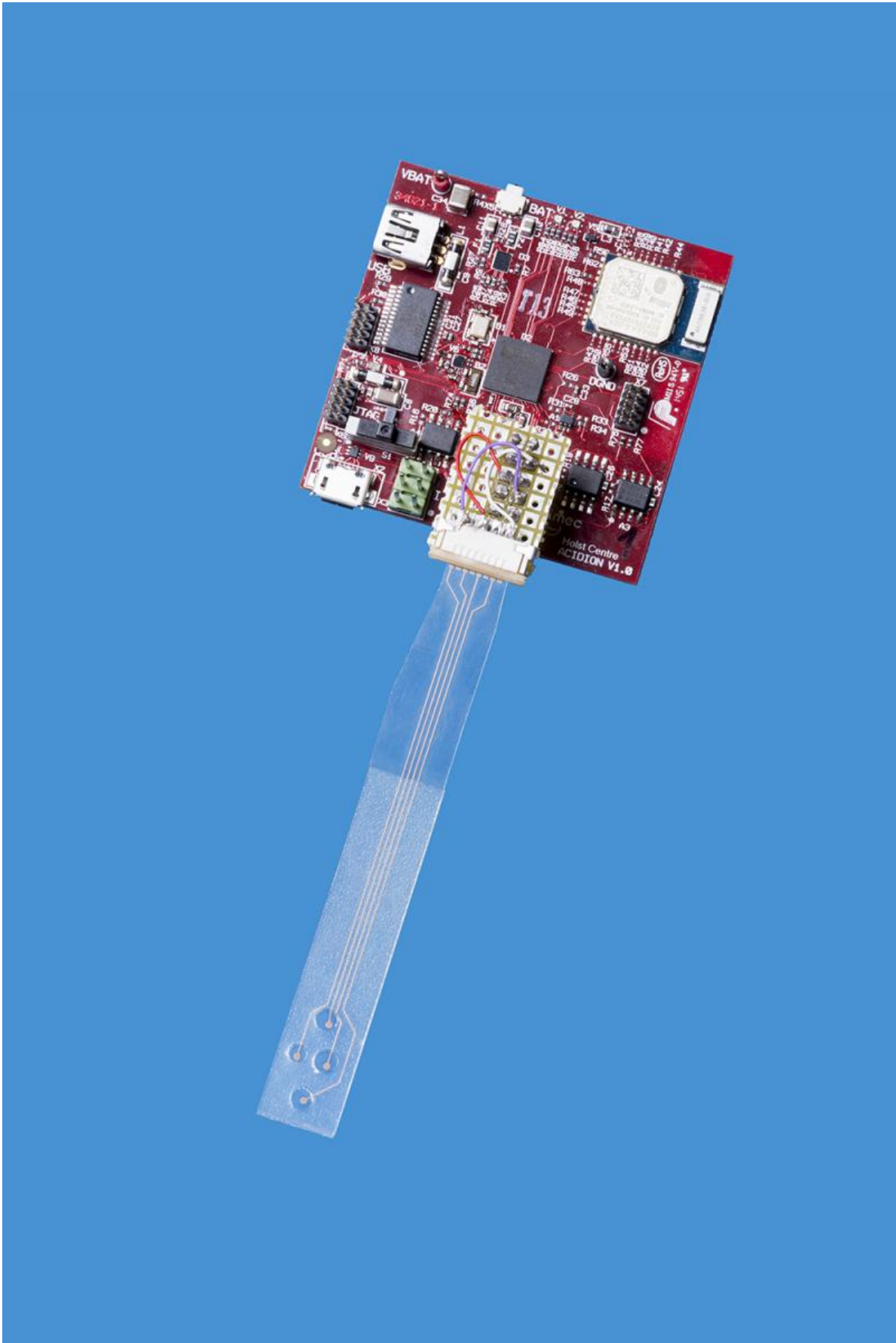


# Versatile single-chip sensor for ion detection in fluids

November 24 2015

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Imec and Holst Centre (set-up by imec and TNO) have demonstrated a prototype of a single-chip electrochemical sensor for simultaneous detection of multiple ions in fluids. The demonstrator paves the way to small-sized and low-cost detection systems for agriculture, healthcare and lifestyle applications, food quality monitoring and water management.

Imec and Holst Centre's ion sensor solution is a generic platform that can be tailored towards specific applications. It enables efficient and low-cost monitoring, such as monitoring of nutrient concentrations in surface and waste water, both for agricultural applications and water quality. In the healthcare and lifestyle applications, it provides disposable point-of-care solutions, or conformable solutions for integration into patches. Depending on the application and the form factor, it can be mass produced through microfabrication or through screen-printing on inexpensive substrates such as glass or foil. As compared to commercial ion sensors, this brings a unique advantage in terms of low cost manufacturability, and size of the solution. Moreover, by changing the selective membranes on the electrodes, the sensor can be adopted to detect other ions.

The presented prototype is a handheld device that integrates a single-chip sensor with different electrodes that detect pH levels in a range from 2 to 10 at a 0.1 pH accuracy. For the chemical elements chloride ( $\text{Cl}^-$ ), sodium ( $\text{Na}^+$ ), potassium ( $\text{K}^+$ ), and nitrate ( $\text{NO}_3^-$ ) -ranging from  $10^{-4}$  M to 1 M ions- the sensor detects at a 10 percent accuracy.

Benchmarked against other available single-ion sensors, imec's prototype

demonstrated comparable sensitivity and accuracy for a versatile multiple-ion solution.

"With small autonomous smart sensors that adapt to and wirelessly communicate with the environment and each other, imec aims to develop the building blocks that enable an Intuitive Internet of Things," stated Kathleen Phillips, program director perceptive systems at imec. "Our scientists and engineers have reached an important breakthrough demonstrating the capabilities of our technology with this versatile single-chip sensor. As we continue to improve our sensor platform, develop sensors for other ions, integrate more [sensors](#) into a single system, and extend the lifetime of our sensor, imec will be at the nucleus in driving the advancements of smart connected systems. We invite industry to join our R&D program, become a partner to jointly develop new ion sensing applications and to bring this technology to the market."

Provided by IMEC

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