Collaborative Development of Innovative Blood Testing Technology

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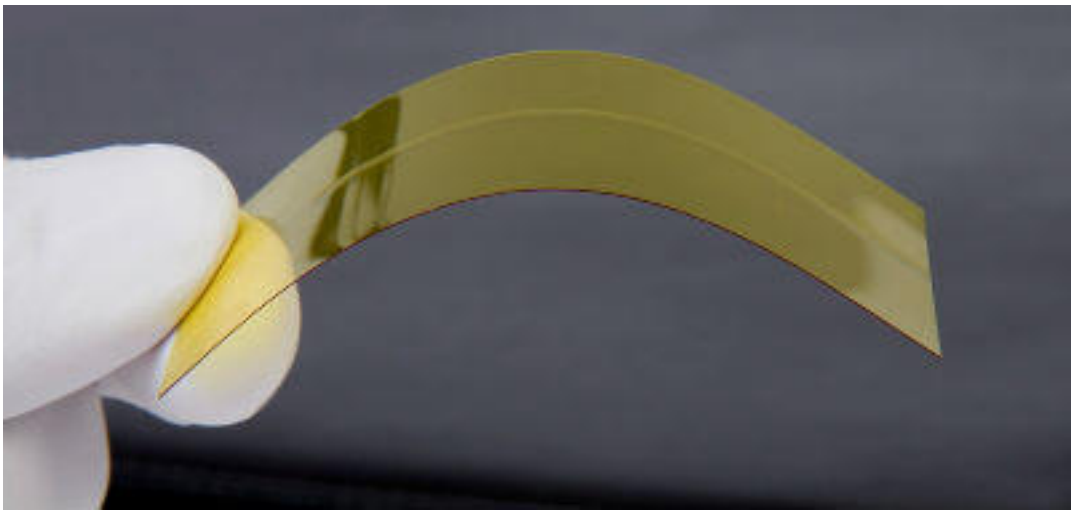

Leading companies and institutes in protein diagnostics and micro-nano-bio research, including Philips, imec, Hytest, PolyAn, Bremen University, and Eindhoven University of Technology, have joined forces to investigate next-generation technologies with the goal of enabling new, highly sensitive, point-of-care blood tests. Within three years, the project aims to develop a novel, polymer microtechnology device; bio-molecular interfacing technologies; and biophysical discrimination technologies. In addition, the goal is to integrate these into a prototype for high-resolution detection of protein biomarkers.

Blood tests provide pivotal medical information and are used in 70% of all medical diagnoses. Today however, in the vast majority of cases, a conclusive diagnosis can only be reached with the accuracy and reliability of a central hospital laboratory. Patients could therefore greatly benefit from near-patient, high-quality testing that is sufficiently swift, robust, and convenient to be used in community care centers, at doctor's offices, and even by patients at home.

Imec and its associated lab at the University of Ghent will contribute to the project by developing polymer-based microtechnologies for biomarker detection integrated in a functional prototype device. The key innovation challenge will be to integrate the new NextDx micro/nano-biotechnology in a compact system without compromising sensitivity. To do so, the aim is to develop a highly sensitive platform based on polymer optical cartridges. Optical detection systems have been proven to be very sensitive, while polymer technology is known to be cost effective and allows compact integration and packaging.

The NextDx sensor concept is based on the detection of bio-functionalized magnetic nanoparticles in an optical field. After actuation by an external magnet, the target

molecules in the sample end up locked between the active sensor surface and the nanoparticles, after which they can be detected optically. Imec will develop precision polymer waveguides to generate a well-defined optical field that will allow detection with single nanoparticle resolution.

By the end of the project, NextDx aims to demonstrate an integrated micro-nano-bio system (MNBS) platform technology for extremely sensitive protein detection, within a few minutes, directly in blood plasma. The partners will also have integrated these technologies into a prototype system for biomarker detection. In addition, this prototype biosensing system will be demonstrated for the rapid detection of a representative cardiac biomarker: cardiac troponin I.

For more information, visit www.nextdx.eu [1].

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