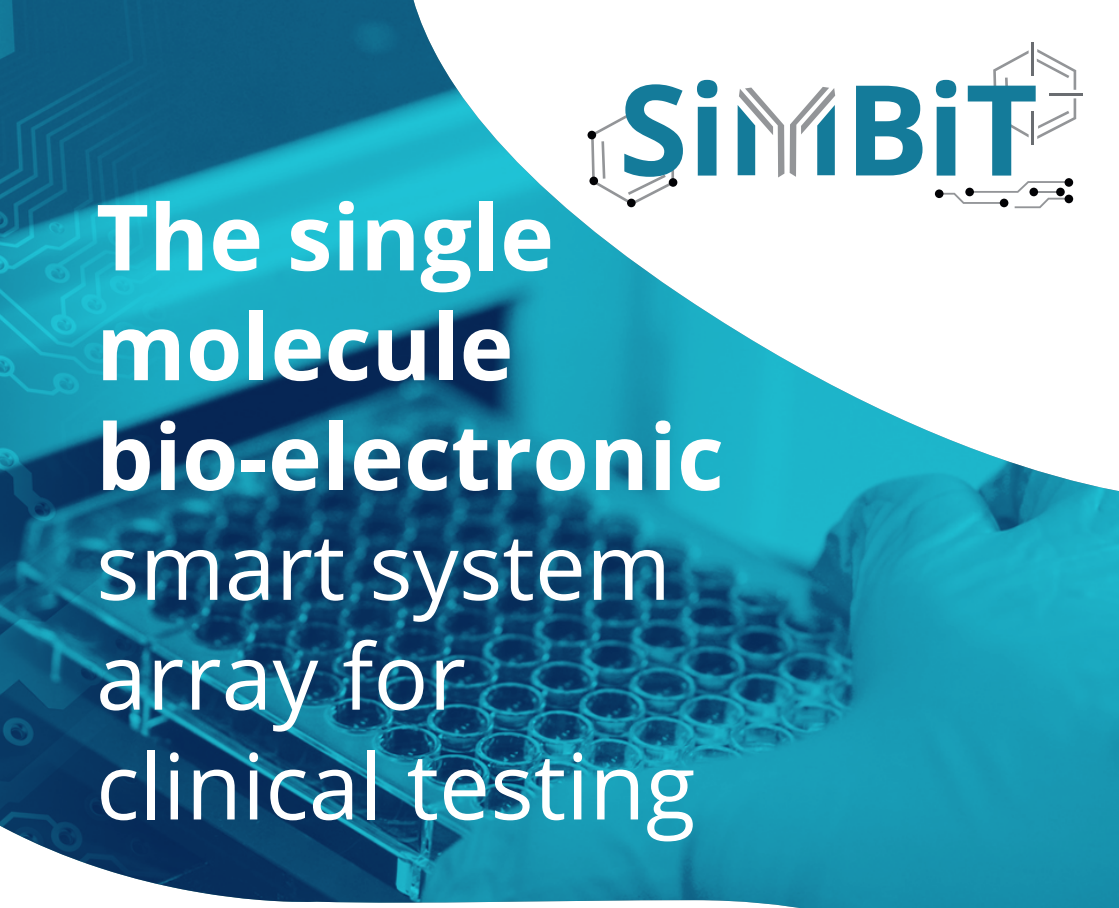
SiMBiT

The single molecule bio-electronic smart system array for clinical testing



Development of a disruptive bio-electronic smart system which will enable massive use of a high throughput array-based assay.

CONTEXT

ELISA after more than 40 years since its discovery, is still the most popular multiplexing assay to quantify protein bio-markers despite the performance level limited by: multi-step assay, low sensitivity, low dynamic range.
Digitizing biomarkers analysis by quantifying them at the single-molecule level is the new frontier to advance the science of precision health.
The enhancement of the technical capabilities of bio-electronics systems, by giving clinicians the possibility to rely on biomarkers quantification down to the single-molecule, holds the potential to revolutionize the way healthcare is provided nowadays.

CONSORTIUM

The SiMBiT consortium is built up of a very diverse but well-balanced interdisciplinary team, which encompasses competences in all needed fields of knowledge and in all different steps of the value chain. It is composed of 8 technical partners: 6 academic structures (CSGI-University of Bari; University Hospital of Duesseldorf; University of Brescia; Åbo Akademi University; Italian Institute of Technology; Eindhoven University of Technology) and 2 companies (FlexEnable and MASMEC), supported by a consulting firm (Efficient Innovation).

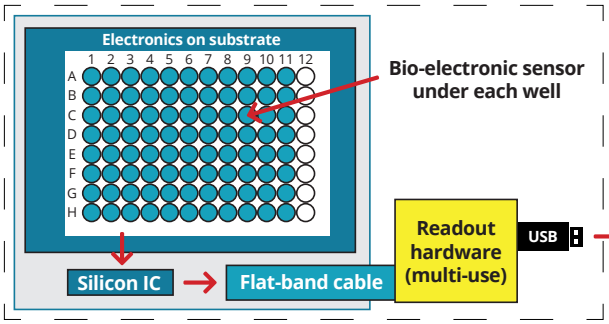
PROJECT

The SiMBiT project will develop a bio-electronic smart system leveraging on an existing lab-based proof-of-concept that can perform single-molecule detection of both proteins and DNA bio-markers.

Ultimately sensitive

Multiplexing

SiMBiT bio-electronic smart system



Fast time-to-results and label-free

Non invasive

Protein / DNA versatility

Cost-effective

RESEARCH PROGRAM

The SiMBiT's activities will develop the lab-based device into a cost-effective portable multiplexing array prototype that integrates, with a modular approach, novel materials and standard components/interfaces.

The SiMBiT's platform exhibits enhanced sensing capabilities: specificity towards both **genomic and protein markers** along with **single-molecule detection** limits and **time-to results within two hours.** This makes the SiMBiT's prototype the world best performing bio-electronic sensing system ever.

The platform is also **single-use and cost-effective** and can work in low-resource settings. The SiMBiT's field-effect sensing system will be fabricated by means of future mass manufacturable, large-area compatible, scalable techniques such as printing and other direct-writing processes. The SiMBiT's prototype will demonstrate, for first time, a matrix of up to 96 bio-electronic sensors and a Si IC chip for the processing of all data coming from the matrix, multiplexing single-molecule detection. As the Si IC pins are limited the chip area is reduced and its cost minimized, enabling a single-use assay plate.

SiMBiT will apply the multiplexing single molecule technology to the **early detection of human pancreatic neoplasms** in a well-defined clinical context, performing simultaneous analysis of genomic and protein markers with a **minimal sample volume**, a reduced cost and time-to-result.

SiMBiT

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Project SiMBiT

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