PROJECT FACTSHEET

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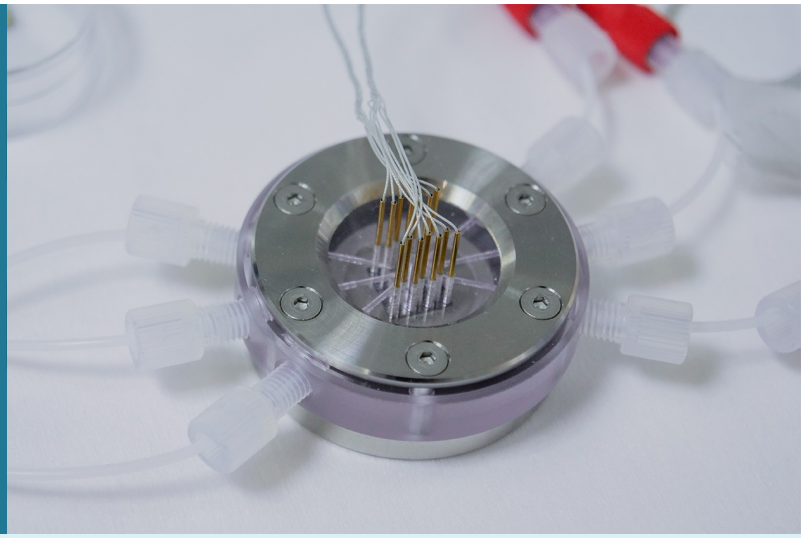
ElectroMed

Developing an innovative programmable high-throughput peptide microarray technology for next generation precision medicine.



Inspiration

In the last decade, precision (or personalized) medicine have become relevant research approaches in the cure of high prevalence diseases, such as cancers and infections. Despite the growing number of technologies, as for example protein screening instruments, the development of individual-based treatments remains a very expensive and time consuming process.

Recent scientific advances proved the potential of immunological treatments in the remissions of certain cancer types. *In silico* methods based on computer algorithms allow to identify peptides candidates enabling an efficient immune system response in the fight against cancers. However, those promising methods, based on prediction models, show a high rate of false positive results. In addition, the interactions between these molecules and the immune system cannot be fully characterized due to the enormous number of combinations, as well as the current instruments constraints to both spot and synthetize arrays of complex molecular entities while managing small quantities of reagents.

Innovation

The objective of ElectroMed is to build and validate a proof-of-concept prototype of a programmable high-throughput peptide microarray technology. This European funded project aims to integrate electrochemical synthesis of peptide bioreceptors with sensitive Field Effect Transistors (FETs) in order to enable programmable *in situ* protein detection.

We will make use of a system utilizing nano-liter chemistry on a chip for the functionalization of FinFETs – fin field-effect transistor, which is a multigate device built on a substrate - sensors for high-performance data acquisition within a microfluidic-driven multiplexed platform for parallel screening.

During this multidisciplinary project we will develop the concept of multiplexed electrochemical peptide synthesis (EPS), and improve the capabilities of FinFET sensors, in order to embed them into a unique cost-effective lab-on-chip prototype. The latter will be then validated by the researchers in laboratory-relevant conditions for the screening of peptide sequences in cancer vaccines.

Impact

ElectroMed will provide a revolutionary technology for next generation precision medicine by developing the first fully-programmable *in situ* protein screening instrument. By designing a microfluidic-driven multiplexed platform, ElectroMed will enable a faster, affordable, and more efficient technology than current protein screening instruments. Consequently, this unprecedent device will significantly ease and reduce the price of protein screening.

This proof-of-concept prototype will not only open the path to new personalized medicine applications, but it might also be of great interest for the food sector (*e.g. food authenticity and traceability, GMOs or toxin detection*), as well as for the environmental remediation or defense (*e.g. detection of biological warfare agents*).

Partners

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