GOAL :
Detect autoimmune diseases

CURRENT METHOD :
D-TEK DETECTION

SYSTEMIC SCLERODERMA
SHARP'S SYNDROME

SJÖGREN'S SYNDROME

LUPUS

PDSM prisme

D-tek

Multitel
INNOVATION CENTRE

SPR
multiplex chip

SAMPLING

antibodies

antigenes

patient fluid

plasmonic layer

prisme

intensity

molecular binding

reflected angle

time

Interactions between substrates
and enzymes produce a colour
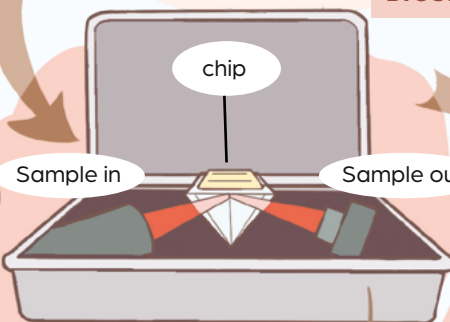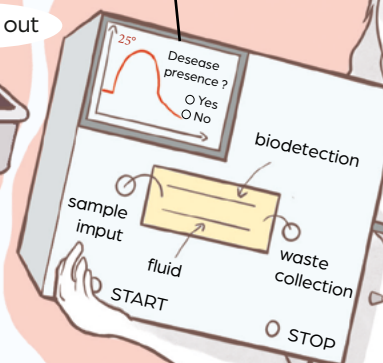change!

source
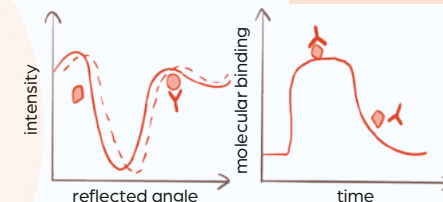
detector

BIOSENSING TOOL

chip

LCD screen

SPR KIT

→ quick tests
(+/- 20 minutes)
directly made in
the medical room

→ less expensive
(+/- 5000 €
for 12 markers)

→ easy to carry

Sample in

Sample out

25°

Desease
presence ?
O Yes
O No

DETECTION

→ 2 hours test

→ high cost

→ detects only one disease

Camera image
for 12 channel
plasmonic sensor

biodetection

sample
imput

fluid

waste
collection

START

STOP

SIVARAMAKHRISNAN **GANESAN**

COUNTRY OF ORIGIN	INDIA
COUNTRY AT TIME OF SUBMISSION	FRANCE
DURATION	36 MONTHS
PROMOTERS ▾	
MULTITEL (DR FABIAN DORTU) | **WWW.MULTITEL.BE**	
D-TEK (NICOLAS BODART) | **WWW.D-TEK.BE**	

FASTER DETECTION OF AUTOIMMUNE DISEASES

After graduating as an electronics and communication engineer from Veltech University in Chennai, Sivarama-krishnan Ganesan completed his master's in Molecular nano and biophotonics for two years at the École normale supérieure in Paris-Saclay, as part of an Erasmus Mundus scholarship, before beginning his doctorate at the Institut d'électronique de microélectronique et de nanotechnologie, a research institute of the universities of Lille and Valenciennes, the French National Centre for Scientific Research and the Institut supérieur d'électronique et du numérique. «*During my Ph.D.,* explains the researcher, *I worked on the development of an optical biosensor based on the surface plasmon resonance, the SMARTBIOSENSE cross-border project, between Belgium and France, supported by the European Union. Because of its multidisciplinary nature, this project allowed me to discuss and share my views with researchers from different fields of research.*»

This project is particularly relevant to current events because of the coronavirus situation, «*the existence of a biosensor could have reduced the number of deaths through early detection and, in fact, limited the panic effect within the population.*» Today, Dr Ganesan wants to continue in this vein: «*I want to develop this instrument further to make it more innovative. Together with MULTITEL and D-Tek, a specialist in in-vitro diagnostics, we will develop a portable optical biosensor with a very low detection limit and highly sensitive, the functionality of which could even be extended to other types of biosensing than the one currently used by D-tek.*»

But Dr Ganesan has a wealth of resources and remains eager to learn. «*During my BEWARE mandate, I will take part in the MULTITEL training sessions on the design and development of complex optical systems, optical modelling, C++ programming on embedded Linux systems and electronics for controlling optoelectronic devices,*» stresses the researcher.

During his PhD, Siva Ganesan taught at the University of Lille for three years. «*I would like to extend this teaching experience at a university in Belgium.*» If he has the time!

THE **SPRAIDDLAB** PROJECT

Autoimmune diseases are caused by an inappropriate immune response against the body's own components, resulting in chronic inflammation, tissue destruction and/or organ failure. In order to diagnose and characterise these diseases, laboratories routinely use enzyme-immunoassay multiplexed diagnostic kits (which can simultaneously identify several autoantibodies).

There are multiple limitations with this technique:

- a lack of reproducibility of the reaction medium (nitrocellulose)

- the need to use reagents (secondary antibody, substrate, wash buffer) which lengthen the test duration (minimum 1 hour for the test) and have a significant environmental impact (biological waste, plastic bottles)

Photonic sensors on microfluidic and label-free chips can be used to circumvent these limitations.

The objective of the SPRAIDDLAB project is therefore to develop a portable- easy to use biosensing instrument to detect autoimmune diseases.