

The **POSITIVE** Consortium



Universitat de València is one of the oldest, largest and most important universities in Spain and participates as project coordinator through the Unit of Materials and Optoelectronic Devices (UMDO) from within the Institute of Materials Science (ICMUV).
Contact: Prof. Juan Martinez Pastor, martinep@uv.es, URL: www.uv.es/umdo



Centre Suisse d'Electronique et de Microtechnique is an applied R&D center specializing in micro- & nanotechnology, microelectronics, and system engineering. It leads the fluidic and optical measurement platform development and also contributes to the microfluidic sample handling and microsystem packaging.
Contact: Dr. Helmut Knapp, Helmut.KNAPP@csem.ch, URL: www.csem.ch



Farfield Group Ltd is a UK instrumentation company specializing in measurement of conformational changes in proteins for bioanalytical purposes. Farfield's technology measures sub atomic dimensional changes in proteins implicated in a host of disease processes and is used to study the disease mechanism and drug candidates to inhibit it.
Contact: Dr. Gerry Ronan, gronan@farfield-group.com, URL: www.farfield-group.com



Charite Universitaetsmedizin Berlin is one of Europe's largest university hospitals, the department of pediatric pneumology and immunology focuses on the development of better diagnostic and therapeutic approaches for allergic diseases including food allergy.
Contact: Dr. Kirsten Beyer, Kirsten.Beyer@charite.de, URL: www.charite.de



Phylogene SA is a specialized R&D and service laboratory located in the south of France that has developed a range of tests to allow allergen tracking in food.
Contact: Dr. Gilbert Skorski, g.skorski@phylogene.com, URL: www.phylogene.com



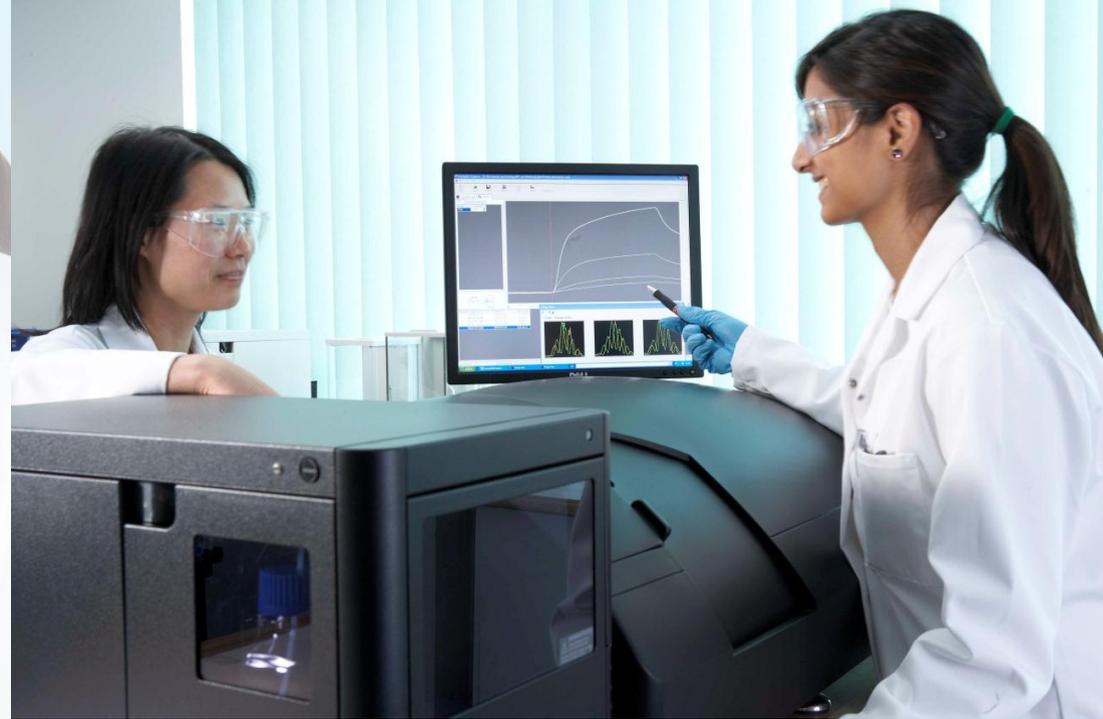
Università degli Studi Di Trento - The Nanoscience Laboratory is within the Physics Department of the University of Trento. The activities of the laboratory are along three main research lines: silicon photonics, nanophotonics and nano-biotechnologies.
Contact: Prof. Lorenzo Pavesi, pavesi@science.unitn.it, URL: science.unitn.it/~semicon/



Consiglio Nazionale delle Ricerche - The Institute of Molecular Recognition Chemistry (ICRM), based in Milan, is one of the several research institutes of Italian National Research Council (CNR).
Contact: Dr. Marcella Chiari, marcella.chiari@icrm.cnr.it, URL: www.icrm.cnr.it



KTH – the Royal Institute of Technology The **Microsystem Technology Lab** is a leading MEMS and microfluidics group. It leads the integration of the biochip.
Contact: Prof. Wouter van der Wijngaart, wouter@ee.kth.se, URL: www.ee.kth.se/mst



The **POSITIVE** consortium...

- ❑ will develop a label-free biosensor for the point of care evaluation of food allergy risks
- ❑ will create disposable lab-on-chip cartridges with integrated microfluidic sample preparation and ultrasensitive photonic transducers, as well as a bench-top readout system
- ❑ focuses on a rapid solution (<15 minutes) with little hands-on time, so as to be used at point of care in an intensive care unit by paramedics and General Practitioners
- ❑ consists of six research centres and two industry partners from seven European countries
- ❑ is supported during 2010-2013 with 2.9 Million Euro by the European Union through its Seventh Framework Programme

POSITIVE contact point

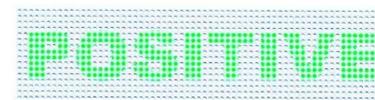
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www.fp7positive.eu

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A highly integrated and sensitive POrous multiple quantitaTIVE monitoring of Food

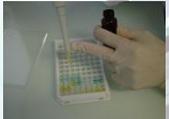
Silicon based lab on a chip for allergies at point of care

Food allergy as a condition and current diagnostic methods

Food allergies can provoke clinical reactions whose most severe is anaphylaxis, with respiratory and/or cardiovascular problems that might result in death. They are common in 1-2% of adults and up to 8% of children, corresponding to a serious public health problem that affects over **15 million people in Europe** from infants to the elderly and its prevalence is increasing.



The skin prick test is the most commonly used test for allergy diagnostics. However, this test has its limitation in patients with severe allergic reactions (anaphylaxis), eczema, taking anti-histamines and young children, where the tests are difficult to administer. Unfortunately, food allergy is most frequently seen in young children with eczema and/or severe reaction in the past.



Therefore, blood based tests, mostly using the FEIA, RAST and ELISA techniques are often used. These tests are normally performed as a laboratory test using sent-in blood samples. On the other hand point-of-care (PoC) devices exist; however, they are currently able to assay only few allergens at a time. Other immunological blood tests, using enzymes, are now superseding the original methodology. Moreover, the existing market PoC products provide at best semi-quantitative determination of allergy sensitization.



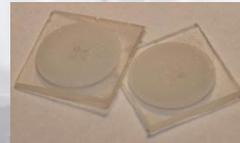
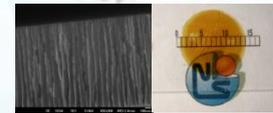
Lab-on-chip technology for rapid and low cost quantitative determination of hundreds of food allergies

POSITIVE is developing a state-of-the-art diagnostics Lab-on-a-Chip platform via an integrated microfluidic sample preparation technique capable of serum preparation from whole blood of volumes, <100µl. A final prototype consisting of a packaged biochip and reader will be used on clinical samples in order to determine sensitization to allergens such as that for hen's eggs, cow's milk, peanuts, wheat, tree nuts, fish, sesame, and shrimp ingestion.

Project Innovation to date

The project has just completed its second year and it has made some great advances against very difficult challenges, proof of that coming recently in the form of successful bio-sensing experiments. In working towards the readiness of technologies necessary for realizing the Positive instrument we have developed technologies that not only offer functionality that the machine requires but will also have numerous applications across many areas of life. Such advances include:

- Development of a reliable and reproducible process to obtain porous membrane with highly tailored structural properties (thickness, porosity and pore size) and that shows a fluidic-friendly behavior.
- The development of OSTE materials. OSTE is the first polymeric material developed specifically for the needs of microfluidic devices. We envision that OSTEs will be a very strong alternative for rapid prototyping of microfluidic devices thanks to rapid turnaround, high yield and properties very close to those found in the final commercial products.
- Development of a proprietary robust polymer coating that makes the surface functionalization of sensors easier, faster and reproducible, enables a high probe density and has a good stability. The area of potential applications is very diverse and large.



- A module developed for blood filtering that enables several 100 ul of whole blood to be filtered and plasma to be generated for subsequent analysis. This will find uses in lab on chip applications which require alternatives for plasma extraction from whole blood samples which is currently done in dedicated laboratories by centrifugation.
- The development of an instrument based on multiple spot phase change measurements on a flow through membrane. This overcomes limitations found in solid surface, planar assay systems which have to be incubated for long periods of time for the molecules of interest to be captured at the sensing surface.

