



FP7 Coordination and Support Action to fund 50 technology transfer projects (TTP) in computing systems. This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement n° 609491.

## Lab-on-Skin with Zero-Power Interface

Hoël Guérin, Adrian Ionescu, EPFL, Switzerland  
Esmeralda Megally, Xsensio, Switzerland

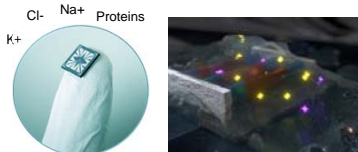
### TTP Problem

Wearable devices for health monitoring have **limited capabilities**



**Opportunity:** add relevant biochemical metabolic data from biofluids to classic physical parameters

Integrated FinFET sensing platform for analyte detection in biofluids



Outperforms commercialized technologies in terms of size, sensitivity, power & stability

**Challenge: How to perform biofluid collection and delivery complying with continuous on-body monitoring constraints?**

Body interface requirements

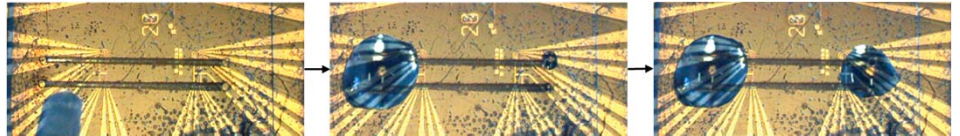
- Low power = no micro-pumps
- Integrable with sensing technology
- Upscalable production
- Biocompatibility

### TTP Solution

**Chosen solution:** zero-power, capillary nanofluidic channels interface for on-body, sweat surface-collection and delivery.  
> allows infinitesimally small sweat droplets to be collected at the surface of the skin without the need for a pump.

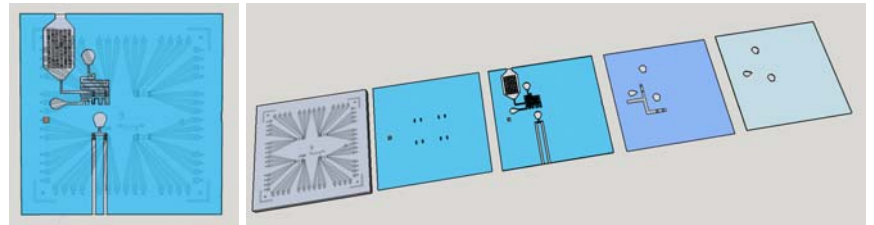
#### Past achievements:

Passive capillary collection system (1nL) proof-of-concept achieved manually on sensor die



#### Next steps:

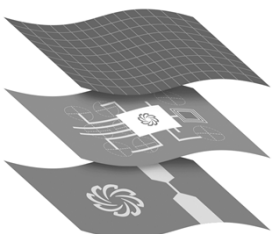
- Capillary nanofluidic interface fully-integrated on sensing platform
- Up-scalable, wafer-scale production process
- Material: biocompatibility full assessment



Conceptual diagram of the envisaged solution

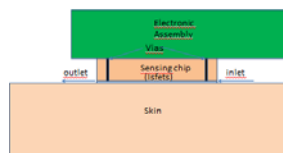
### TTP Impact

**Goal:** produce the first miniaturized, very low power "Lab-on-Skin" sensing platform



1st reported heterogeneous integration of:

- Computing and wireless communication
- Sensing and readout circuitry
- Zero-power, capillary nanofluidic interface



Unique miniaturized wearable sensing module collecting data through sweat at the skin surface

Exploit wealth of metabolic data at the surface of the skin in real time (electrolytes, molecules, proteins...)



**Application:** Embeddable into health, wellness consumer electronic & care products

### TTP Facts

Contact: Adrian Ionescu  
E-mail: [adrian.ionescu@epfl.ch](mailto:adrian.ionescu@epfl.ch)  
TETRA COM contribution: 40000 €  
Duration: 01/01/2016-31/07/2016



ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE