**Group:** Advanced Materials for Chemical Sensitivity (AMCS)
**Project:** **Ion-Selective Sensor Devices**
**Supervisors:** Jay Gamaethiralalage, Louis de Smet & Holst Centre (+ collaboration with TUD)

## Introduction

Body fluids (sweat, tears, saliva etc.) are an important source of information. The analysis of said body fluids is interesting for sports and medical applications, especially when one can measure different parameters continuously, as it could alert users of dehydration and fatigue and/or to provide an alarm that some medication has to be taken.

Recent advances, especially in electrochemistry, make it possible to place a sensor directly onto the skin: sensors have not only become miniaturized, they can also be easily integrated in a flexible wearable sensor (Figure 1). Coupling wearable sensors with smart devices, for continuous monitoring of critical parameters, has also become increasingly popular due to ample availability of such devices utilizing wireless communication methods (NFC, Bluetooth, WiFi etc.).

## Goal

To develop a wearable ion-sensor selective towards specific electrolytes in sweat.

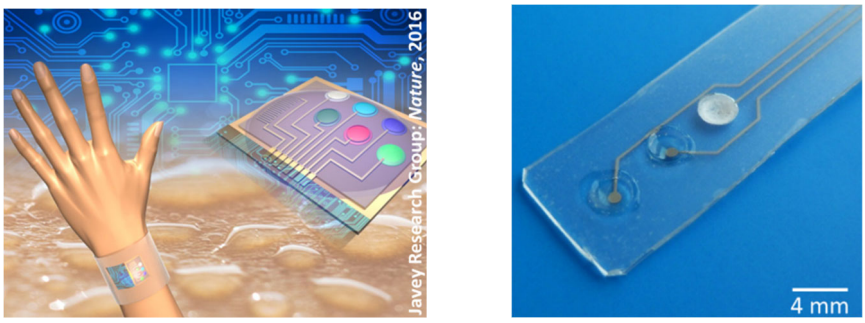


**Figure 1.** (Left) Schematic illustrations of a multiplexed perspiration analysis, showing a wearable sensor on a subject's wrist and a detail of the sensor lay-out containing several active sensors spots (source: Javey and co-workers, Nature, **2016**, *529*, 509–514), (right) Flexible screen-printed ion-selective sensor (courtesy: Holst Centre).

The following questions guide the research topics: how can one measure different components simultaneously (multiplexing)? How to extend the life time of such sensors? How to "renew" the sample in pre-defined intervals? Our approach to further develop wearable sensor platforms is mainly focused on the design and preparation of polymers and polymer coatings that are specifically sensitive for one type of ion/component, like $Na^+$, $K^+$, and eventually certain sugars or lactate. Furthermore, we work on improving the adhesion of these polymer coatings onto the sensor support. This project is performed in strong collaboration with the Holst Centre, Eindhoven (Dr Zevenbergen).

## Techniques to be used

- Synthesis (+ NMR, UV-Vis, IR);
- Surface modification and characterization (XPS, AFM);
- Various analytical and electrochemical techniques.

## For more information

1) Javey and co-workers, *Nature*, **2016**, *529*, 509 [link] (+ various media contributions, see this link); 2) Youtube movie on pH sensing by Holst Centre [link]; 3) Interview *Chemisch2Weekblad* [link] 4) Lab Chip, **2018**, 18, 3750 [link] 5) Adv. Funct. Mater. **2018**, 28, 1805754 [link].

## Contact

Jay Gamaethiralalage, jayaruwan.gamaethiralalage@wur.nl, 0317-482375, Helix 7.037.
Louis de Smet, louis.desmet@wur.nl, 0317– 481268 / 82361, Helix 7.034.