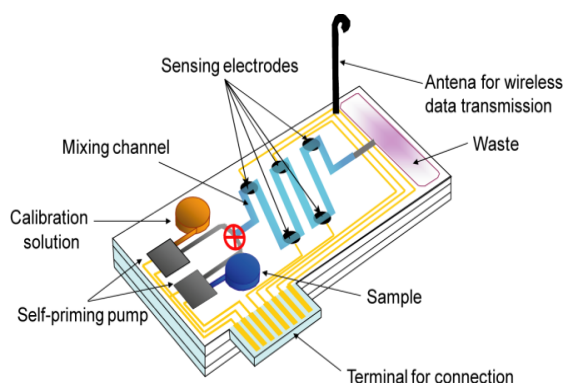


NCSR Hamilton Scholarships 2009 Project Proposal

INTEGRATION OF MINIATURE, ULTRASENSITIVE CHEMICAL SENSORS IN MICROFLUIDIC DEVICES

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Recent incidents with compromised quality of drinking water (pollution by toxic heavy metal (lead) in Galway) and food (pork contaminated with toxic dioxins) have shown that current methods for monitoring of the quality of essential comestibles are inadequate.



We are working on development of miniature devices featuring sensitive yet simple sensors that could enable obtaining the data *in-situ* and their immediately sending to relevant subjects before contaminated water and food reaches the consumers ensuring reaction in a timely manner. Our project involves integration of ultra-sensitive yet simple chemical sensors into a microfluidic device that has the capability of wireless data transmission as depicted in figure on the left. This project will be the first out many important steps in achieving this goal.

The main aims of this proposed Hamilton Scholarship will be:

- Designing and development of a microfluidic chip that will be used as housing for polymer-based lead-selective electrodes.
- Testing the series of developed chips for the best accommodation of sensors.
- Preparation of lead-selective sensors and their characterization with the view of application in analysis of drinking water quality.

During the project duration, the student will form part of a multicultural and multidisciplinary scientific environment at the Adaptive Sensors Group and the successful applicant will gain experience with several novel techniques like sensor fabrication and development as well as microfluidic device fabrication, which is a hot topic for research these days. Moreover, since this is an already on-going and original project his/her results will easily have a publishable outcome.

Practical techniques and skills that will be learned in this project:

- Introduction to micro-machine and microfabrication techniques for polymer microfluidic fabrication.
- Preparation of polymer-based ion-selective electrodes with trace detection limits (in order of ppb – levels necessary for water quality measurements).
- Introduction to potentiometry.
- Chemistry, Nanotechnology and Microtechnology laboratory skills in a multidisciplinary and multicultural working environment.