Post-Doctoral Position on Development of a microfluidic system to study Proteomics

Context

To date, the vast majority of biochips were developed for ultrasensitive detection of nucleic acids (DNA, RNA), in a diagnostic perspective, through the amplification of genetic material by PCR (polymerase chain reaction) [1]. These approaches allow, for example, extracting the mRNA from a few cells and robust analysis by qRT-PCR (quantitative real-time PCR) [2]. With the advent of the study of proteomes emerged biochips development for protein research "at the molecular level." Unfortunately no technique exists to amplify protein biomarkers and the question of their detection is crucial. The sensitivity of the detection is then limited by the sensitivity of analytical tools. Up to now protein biochips developed are based on fluorescence or electrochemical detection of target species [3].

[1] *Digital PCR*, B. Vogelstein, K.-W. Kinzler, Proc Natl Acad Sci U S A 96 (1999) 9236-9241 ; *Single-molecule DNA amplification and analysis in an integrated microfluidic device*, E. T. Lagally, I. Medintz, R. A. Mathies, Anal Chem 73 (2001) 565-570 ; *High-throughput droplet digital PCR system for absolute quantitation of DNA copy number*, B. J. Hindson, K. D. Ness, D. A. Masquelier, P. Belgrader, N. J. Heredia, A. J. Makarewicz, I. J. Bright, M. Y. Lucero, A. L. Hiddessen, T. C. Legler et al., Anal Chem 83 (2011) 8604-8610.
[2] *On-chip single-copy real-time reverse-transcription PCR in isolated picoliter droplets*, N. R. Beer, E. K. Wheeler, L. Lee-Houghton, N. Watkins, S. Nasarabadi, N. Hebert, P. Leung, D. W. Arnold, C. G. Bailey, B. W. Colston : Anal Chem 80 (2008) 1854-1858 ; *Massively parallel single-molecule and single-cell emulsion reverse transcription polymerase chain reaction using agarose droplet microfluidics* H. Zhang, G. Jenkins, Y. Zou, Z. Zhu, C. J. Yang. Anal Chem 84 (2012), 3599-3606.
[3] *Ultrasensitive protein detection : a case for microfluidic magnetic bead-based assays,* H. Cumhur and M. A. M. Gijs, Lab Chip, 13 (2013), 4711-4739.

Mission

This project proposed the development of a microfluidic system dedicated to the study of proteins and coupled to a sensitive detection method such as mass spectrometry. Early works conducted in our laboratories have identified the first locks of this detection method. We would like to go further and increase the sensitivity as well as the versatility by interfacing our system with different mass spectrometer. In particular, we aim to develop our system for “digital microfluidics”.

Profile

Applicants will have a PhD in Microfluidics/Engineering/Physics or related disciplines and will be motivated by challenges in a multidisciplinary team. Applicants with prior experience in bioengeneering and healthcare applications will be given highest preference.
Applicants will have an experimentalist profile.
Applicants shall speak English or French, and have good communication skills.

Duration: 18 months
Starting date: fall 2015
Localization: LIONS and SIMOPRO at CEA Saclay Gif sur Yvette France

Contacts CV, motivation letter and recommendation letter should be sent to both contacts.
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