**PhD POSITION OFFER**

**Novel Approaches for Sensitive Detection of Doping Substances in athletes**

**Host Laboratory:** UMR CNRS 8612- Institut Galien Paris Sud (IGPS) ([http://www.umr-cnrs8612.u-psud.fr/](http://www.umr-cnrs8612.u-psud.fr/))

**Research Team:** Proteins and Nanotechnology in Analytical Science (PNAS) (Dir M TAVERNA)

**Venue:** Faculty of Pharmacy of University Paris Sud, Châtenay-Malabry, France

University Paris Sud is in the world's top 50 (42nd place) according to the Shanghai index and is also ranked 54th in the Center for World University Rankings. It is the second French university for both rankings. IGPS is an interdisciplinary research unit in pharmacy, biopharmaceutics, pharmaceutical technology and analytical chemistry for diagnostics and is considered as one of the main actors in the field of nanomedicine in Europe. The team PNAS is internationally recognized for its research on development of original electrokinetic-based methods for the study of proteins, peptides being therapeutical ones or potential biomarkers, including those for preconcentration and biomarker enrichment purposes. The team belongs to the major domain of interest “DIM” Respore of Paris Ile de France region and leads the Strategic Research Initiative of University Paris Saclay “SysABCD” (Analytical Systems for Biomarkers and Sustainable chemistry).

**Supervisors:** Myriam Taverna and Thuy Tran

**Salary:** 2135 € per month gross, CNRS funding

**Research project description:** Currently, the screening of a large number of doping substances (DS) in urine of athletes is carried out after non-selective dilution of the sample. This approach is mainly used to screen compounds with limited metabolism and present at relatively high concentration in urine (10-100 ng/mL). In the case of traces of DS, immuno-purification or solid phase extraction (SPE) methods are required, but they are limited due to the possible loss of sample and the risk of cross-contamination. We have recently developed several electrokinetic preconcentration approaches that can be performed by capillary electrophoresis. These preconcentration strategies developed in our group allowed the quantification of biological molecules at extremely low concentrations (1, 2) and open up possibilities for infinite preconcentration of analytes. Thus, the PhD will develop methods based on these approaches to quantify metabolites or illicit hormonal peptides in urine. To further improve detection limits, these approaches can be combined online with solid phase extraction, using monolith for the enrichment of molecules (3). In this project, we will use these new approaches to preconcentrate small growth hormone secretagogue peptides and other molecules found in urine that will be chosen in agreement with the « Agence Française de Lutte contre le Dopage ». The PhD will establish collaborations with this agency to enrich his/her thesis topic and meet the current challenges in anti-doping purposes. Finally, in addition to enrichment and preconcentration methods, the PhD will also develop separation methods based on UHPLC or capillary electrophoresis, possibly coupled to mass spectrometry, for the detection and quantification of these molecules.

**References:**
(1) Crosnier C. et al., Anal Chem 2018, 90, 2555
(2) Mai TD et al., J Chromatogr A 2016, 1453, 116
(3) Araya-Farias M. et al., Analyst, 2017, 142, 485

**Key words:** Capillary electrophoresis, HPLC, mass spectrometry, doping, preconcentration, separation techniques

**Profile:**
- Candidates motivated by analytical science, particularly separation techniques and mass spectrometry, but also by the field of bioanalysis. The candidate must hold an engineering degree and/or a master’s degree.
- Good theoretical knowledge (at least) in analytical chemistry, including separation techniques. An experience in capillary electrophoresis, particularly mass spectrometry, would be an asset.
- Both oral and written English proficiency
- Motivated candidates who have excellent communication skills, teamwork ability, critical and open mind.

**Applications** must include ● a detailed CV ● at least two references (persons likely to be contacted) ● a letter of motivation ● Master 1 or 2 or engineering marks ● possibly a letter of recommendation from a previous training supervisor. Contact thuy.tran-maignan@u-psud.fr and myriam.taverna@u-psud.fr before **September 15, 2019**.