

CTM U1231 SCIENTIFIC SEMINAR

December 21, 2023

10h30 to 11h30 am, room 223 (second floor), UFR Sciences de Santé

Chairman: **Dr. Olivier MICHEAU**

Invited speaker: **Dr Alain WAGNER**

Université de Strasbourg

Institut du Médicament de Strasbourg

Laboratory of Design and Application of Bioactive Molecules

Team Bio-Functional Chemistry

Illkirch, France



Interfacing chemistry and microfluidics: Toward Single Cell Functional Biology

Advancements in single-cell technologies have revolutionized our understanding of cellular mechanisms compared to traditional bulk cell studies. Established techniques like fluorescence-activated cell sorting (FACS) isolate specific cell sub-populations based on surface protein expression. Emerging transcriptomic-based single-cell methods enable simultaneous molecular analysis of hundreds or thousands of cells, proving valuable for uncovering subtle transcriptome variations and identifying previously undetected cell subtypes.

Currently, the imperative lies in developing next-generation technologies capable of quantifying single cells at the proteome and metabolome levels. Addressing this need, a biorthogonal chemistry approach was employed to modify microfluidic droplet interiors with biomarker-specific capture molecules. This transforms each droplet into a functional, pico-liter-sized compartment, effectively trapping all cell-secreted proteins and capturing the proteins of interest at the droplet surface.

This innovative technique, known as Droplet Surface Immunoassay by Relocation (D-SIRe), offers a robust, highly sensitive, and versatile platform for analyzing and screening millions of cells based on secretion criteria. Compatible with primary B-cells, hybridomas, and HEK cells, it has been customized for discovering antibodies against soluble proteins, peptides, and notably native GPCRs.

Selected publications:

Droplet Surface ImmunoAssay by Relocation (D-SIRe) for high throughput analysis of cytosolic proteins at the single cell level. R. Dufosse, S. Ursuegui, S. Baudrey, K. Pernod, S. Mouftakhir, M. Oulad-Abdelghani, M. Mosser, G. Chaubet, M. Ryckelynck, A. Wagner, **2023 ACS Anal Chem**. Doi: 10.1021/acs.analchem.2c05168

Droplet Surface Immunoassay by Relocation (D-SIRe) for High-Throughput Analysis of Cytosolic Proteins at the Single-Cell Level. Dufosse R., Ursuegui S., Baudrey S., Pernod K., Mouftakhir S., Oulad-Abdelghani M., Mosser M., Chaubet G., Ryckelynck M., Wagner, *Anal. Chem.* 2023. 95, 9, 4470-4478.

Copper-free click chemistry for microdroplet's W/O interface engineering. S. Ursuegui, M. Mosser, A. Wagner, *RSC Advances*, **2016**, 6, 94942 – 94948