

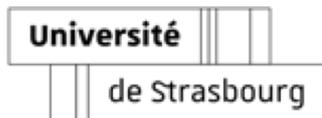
16th URA International Seminar

DATE: NOVEMBER 14th -2022

TIME: 15 : 00 - 16:30

VENUE: TSUSHIMA --

岡山大学創立五十周年記念館
50th Anniversary Hall- 2nd Fl.



Interfacing chemistry and microfluidics: Toward Single Cell Functional Biology-

Dr. Alain Wagner,
Strasbourg University and CNRS – France

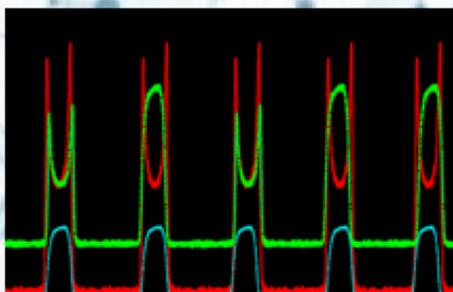


ABSTRACT

The fast development of single cell technologies has made possible detailed investigations of mechanisms that could not be observed from bulk cells samples. For instance, fluorescence-activated cell sorting (FACS) allows the isolation of cell sub-population from heterogeneous samples, on the basis of a selected panel of surface protein expression. More recent transcriptomic-based single cell enabled the simultaneous molecular analysis of hundreds or thousands of cells. It is specifically efficient for the analysis of transcriptome variations allowing the discovery of previously undetectable cell subtypes.

Today the development of advanced generation of technologies opening-up quantification of single cell at their proteome and metabolome level is highly desired. In particular, secreted molecules are main modulators of most adaptive and immunomodulatory processes. However technologies to analyze single cell secretion of large cell populations and to recover rare clones have not yet been reported.

To advance that field of research, we have used a biorthogonal chemistry approach (see 2022 Nobel Prize of Chemistry: Carolyn BERTOZZI) to decorate the inner surface of microfluidic droplets with molecules that can serve as biomarker-specific capture hook. Each droplet is thus transformed into a functional pico-liter size compartment enabling to imprison all protein secreted by the inner cell and capture the proteins at the droplet surface. Those secreted and captured biomarkers are then analyzed via novel Droplet Surface Immunoassay by Relocation (D-SiRe).



Convenient screening of millions of cells as a function of secretion criteria can be performed by using this robust, highly sensitive and versatile technology. It is compatible with primary B-cell, hybridoma, HEK cells and was tailored for the discovery of antibodies against soluble proteins, peptides but most notable against native GPCR. New development focusing of application around exosome secretion and diagnostic applications are currently ongoing.

【Inquiry】

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Alain WAGNER – BIO

Alain Wagner is Director of Research at the CNRS and heads the BioFunctional Chemistry team – BFC - (<http://www.biofunctional.eu>), a CNRS and Strasbourg University joint research unit.

BFC is a founding team of the institute of drug discovery and development (IMS) which addresses a range of challenges of the pharmaceutical sector:

- ** Produce high-quality research up to the pre-clinical stage,
- ** Promote technological innovation through the creation of start-ups ,
- ** Train a new generation of researchers to drug innovation.



Wagner's research is focused on manipulating living systems through the use, in situ, of chemical reactions capable of operating complex biological media. Specific efforts are dedicated to the development of cleavable linkers and payloads characterized by new or combined modes of action for safer Antibody Drug Conjugate (ADC). The use of bio-specific chemistry to intercept reactive metabolites in living organisms is another major component of his research interests.

Alain recently pioneered a microfluidic technology giving access to the analysis and sorting of large populations of single cells on the basis of their secretory activity.

In 2021 Alain co-founded MicroOmiX, a start-up developing advanced single cell-based R&D in the field of antibody and cell based product development.

Combining research and technology transfer Alain authored more than 160 peer reviewed publications

Alain is the inventor of **30 patents** and the co-founder of **5 start-ups**.



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