

## Master 2 Internship position

### Innovating CMOS Lab on Chip for Cancerous Stem cells sorting based on Traveling Wave Dielectrophoresis.

#### Scientific context:

An Internship is proposed at XLIM laboratory/Limoges University in the [BioMEMS and RF sensor](#) group in the frame of the European project (H2020 FET OPEN 2016-2017) "Semiconductor-based Ultrawideband Micromanipulation of CANcer STEM Cells (SUMCASTEC)" that is coordinated by Dr Arnaud POTHIER.

The objective of SUMCASTEC is to explore a radically new approach to isolate and neutralize (CSCs) in real time using electromagnetic waves under *lab-on-chip* environment.

CSCs represent a specific subpopulation of cancer cells responsible for therapeutic resistance and recurrence in brain cancers. Although rapid detection and isolation of CSCs appear essential for patient care and survival, CSCs remain nowadays difficult to isolate, characterize and target due to their undifferentiated phenotype. New strategies involving High Frequency dielectrophoresis for isolation and ultra-sort electric pulse exposure for selective neutralization are very promising and are investigated in the researches led in SUMCASTEC.

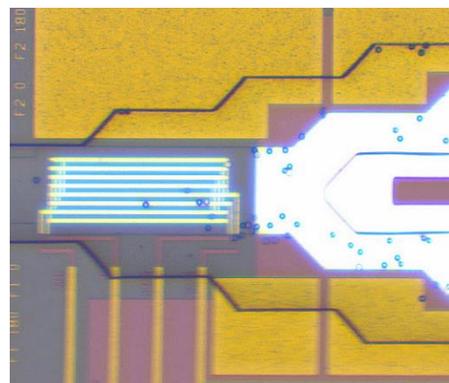


SUMCASTEC consortium involves 6 Europeans partners (<http://www.sumcastec.eu>) with a large transdisciplinary expertise going from Biology and oncology, though biophysics, microwaves engineering and nano/micro technologies for lab-on-chips especially developing combined *microfluidic and advanced CMOS electronic technologies*. It results in a very rich Research & Biotechnology environment for a first research experience.

#### Internship Objective:

The proposed Internship will focus on the on-chip isolation and sorting of brain *cancer stem cells* based on [Traveling Wave Dielectrophoresis](#) on a CMOS microchip.

It will focus on exploiting the difference of dielectric property from the cellular membrane until cytoplasm content between stem and differentiated cancer cells, by submitted flowing cells to multifrequency electric field. It will imply basic knowledge of microfluidic and electrokinetic manipulation, taste of experiment and interdisciplinary, collaborative work with other students and biologists and scientific curiosity. During the internship, the candidate will also have to optimize



the microfluidic network of the chip using COMSOL simulation software, fabricate and test prototype using thick film technology (cleanroom fabrication) and/or PDMS molding. In addition to practical experiment with already manufactured CMOS chip, he/she should also propose some design improvement. He/she will have also to run optical imaging of flowing cell in designed microchannels coupled with fluorescence microscopy and particle tracing. He/she could also take part to cell culture and labelling under biologist supervision.

#### Internship follow-up:

This internship will introduce a PhD thesis starting on the 1st October 2019, in the continuity of SUMCASTEC project research and Nouvelle Aquitaine Council project targeting exosome (cancerous nano-vesicles) role and pathway study in the cancerous stem cell microenvironment. The PhD grant is already founded.



#### Your Offer:

The University of Limoges offers a stimulating work environment in an area of innovation for biomedical science research: (<https://www.youtube.com/watch?v=tj42oTGSSK8&index=14&list=PL6NwgUakgxVJqKV6M2UpbejrsXuxBQtFG>). Especially Limoges city offer a great and peaceful living environment with very attractive accommodation price.

#### Applicant Profile:

This internship research will imply a large experimental work at the interface of electronic, microfluidic and biology. Therefore, the candidate should have a strong background (master) in physics or biophysics, mastering basics of microtechnology and microfluidic. Knowledge in electronic and electromagnetic modeling will be also appreciated.

More generally the candidate should feel at ease with transdisciplinary and we would be able to work as a member of a research team (letters of recommendation from previous supervisors should be provided). Curiosity, self-sufficiency, spirit of initiative will be highly appreciated as well as excellent communication skills, both spoken and written (English mandatory).

#### Internship and Phd Supervisor/contacts:

- Claire Dalmay (DEP & microfluidic) [claire.dalmay@xlim.fr](mailto:claire.dalmay@xlim.fr)
- Arnaud Pothier (Microsystems design and cleanroom fabrication) [arnaud.pothier@xlim.fr](mailto:arnaud.pothier@xlim.fr)

This Internship research work will imply collaboration with biologists from Limoges and Padova Universities.

#### Information and application:

You can send your application, including a motivation letter describing why you should be considered for the offered positions, references (including recommendation letters), and CV (including obtained degrees and previous experiences) to Prof. Claire Dalmay at [claire.dalmay@xlim.fr](mailto:claire.dalmay@xlim.fr)

Internship application limit: 10th December 2018

Internship Duration: 3-4 months