

## Report on UK Fluids Network Short Research Visit ‘Novel micro-bubble and hydrophobic microfluidic technology to explore spermatozoa motility’

*Dr Hermes Gadêlha (Department of Engineering Mathematics, University of Bristol) visiting Prof Stavroula Balabani, Dr Manish Tiwari & Prof Renato Cotta, Department of Mechanical Engineering, UCL*

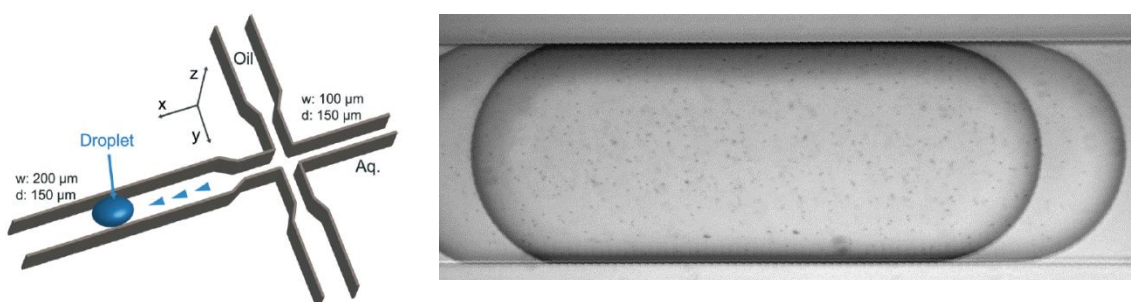
The research visit focused on a new set of experiments applying microfluidic technology to spermatozoa motility at UCL Engineering in collaboration with JSR Genetics (UK livestock). The ambition of the project was to capture spermatozoa with microbubbles using the previous developed microfluidic chips to access the long-time behaviour of spermatozoa.

It was the first time that such an experiment had been conducted, thus revealing difficulties critical for future explorations. The main difficulty found was the lack of compatibility between spermatozoa and the series of oils commonly found in microfluidic labs, most of which were toxic to the spermatozoa. Nevertheless, these preliminary experiments demonstrated the feasibility of trapping cells with microbubbles.

As a direct result of this research visit, we succeeded in securing an inspirational grant of £20K in March 2019, for 6 months starting in May 2019, entitled ‘Microswimmer inspired microscale transport in complex fluids’. This fund is covering dedicated time of a PDRA for 6 months to work in this project, and research visits between all teams involved (Bristol, UCL and JSR Genetics), thus permitting the continuation of the exploration started in this UKFN SRV.

Additionally, during the visit I was invited to deliver a public lecture at UCL Engineering which further multiplied the research links and increasing the collaborative network with both UCL Engineering and Mathematics.

We expect a publication later this year and we shall acknowledge the UKFN SRV role which allowed this work to take place at very early stages of the development.



Microfluidic bubble formation in a rectangular channel with a solution of swimming spermatozoa [Ma et al, On the flow topology inside droplets moving in rectangular microchannels. Lab on a Chip 14, 3611–3620 (2014)]