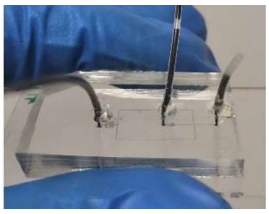
Postdoc open position – 2 years @UNIPD (Italy)

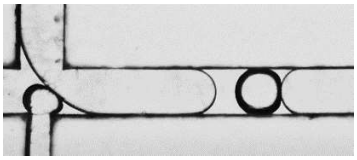
Extracellular vesicle isolation and analysis by innovative droplet microfluidic strategies

Department of Physics and Astronomy
Department of Comparative Biomedicine and Food Science
University of Padova, Italy

Research project and job description.



Extracellular vesicles (EVs) are small-sized (50-200nm) vesicles secreted by the cell membrane that contain various molecular constituents of their cell of origin, such as proteins, DNA, and RNA. They have been regarded as 'cargo ships', which transport and preserve genomic information, playing a role in cell-cell communications. Therefore, they represent a promising biomarker for various diseases, such as different types of cancer, neurodegenerative, and cardiac disorders.
However, today, **the complete knowledge of the EV role and their composition are far from being completely understood, and to fully exploit them for diagnostic applications, a characterization of their heterogeneity is highly demanded**. Additionally, another important issue regarding the analysis of EVs is their **purification, since conventional methods** are costly and not efficient in terms of EV recovery showing high user-dependent variability, preventing comparisons among results from different laboratories. Recently, affinity capture mediated by magnetic beads has also been explored since EVs present specific membrane proteins that can be used as anchor points. However, despite showing promising purification rates, they prevent the recovery of intact EVs after their isolation.



Within our laboratory, we aim to tackle these limitations by developing innovative droplet microfluidic devices that allow low-cost, efficient and reliable purification of intact EVs, as well as their heterogeneity investigation. Although the basic infrastructure has already been set up and preliminary data have shown the capability of the proposed technology, the projects hold challenges on both the microfluidic and biological side. Thus, we are looking for a candidate reinforcing our team in one of these aspects (or both). The candidate will join a highly cooperative and interdisciplinary group working in different research fields, such as microfluidics and microfabrication, EV isolation, and nucleic acid analysis, thanks to an active collaboration between different departments at the University of Padova.
Finally, the activity is supported by a PRIN project that aims to investigate the interaction of the purified vesicles with membrane-like surface in collaboration with the University of Milan and the CNR unit of Trieste.

Required qualifications.

Applicants must hold a PhD in Biotechnology, Physics, Materials Science, Biology, Chemistry, Engineering, or a related discipline. They must have relevant experience in biotechnology and/or in microfluidics.

Responsibilities.

The applicant will be in charge of the development and validation of the microfluidic device for the EV isolation. Depending on his/her profile, the tasks will be mainly focused either on the optimization of the microfluidic devices or on the benchmarking the biological workflow for the EV isolation and analysis.

How to apply.

Applicants should send their CV and cover letter (one A4 page) by 30 September to: davide.ferraro@unipd.it
Starting date: January 2024 - February 2024.
Contract period: 24 months. // Salary: depends on the experience of the applicant.